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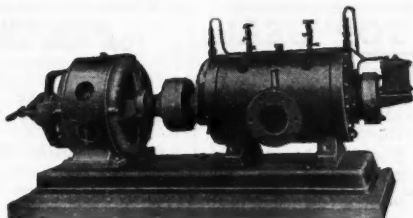
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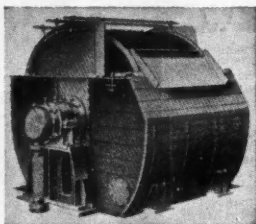


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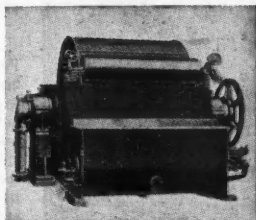
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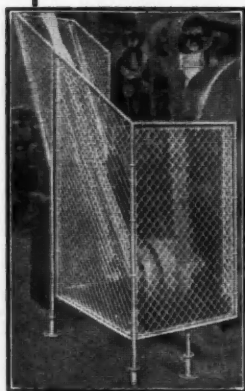
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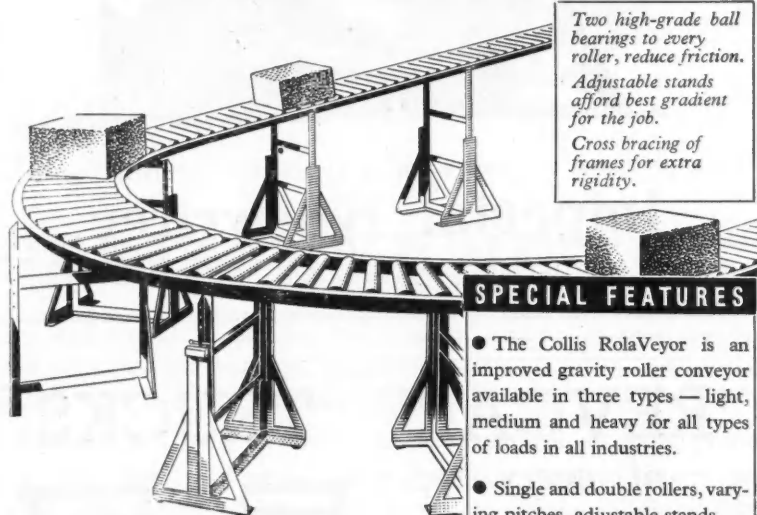


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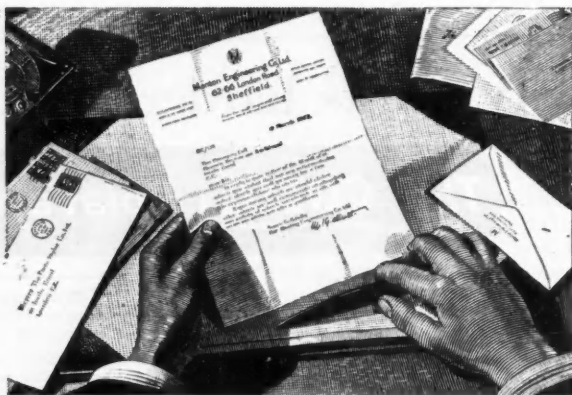
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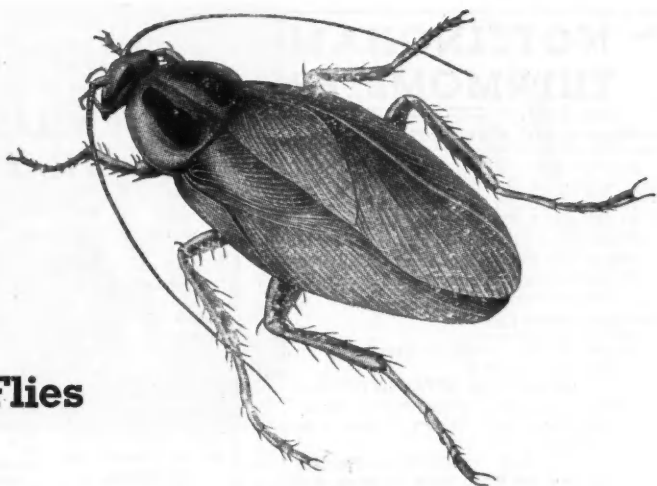
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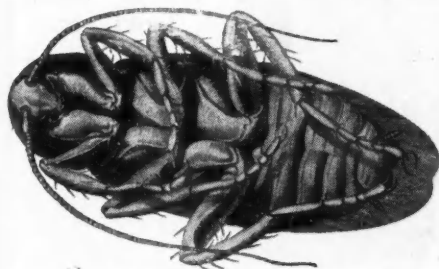


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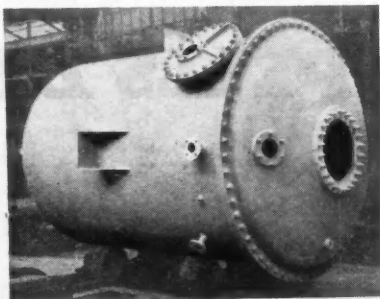
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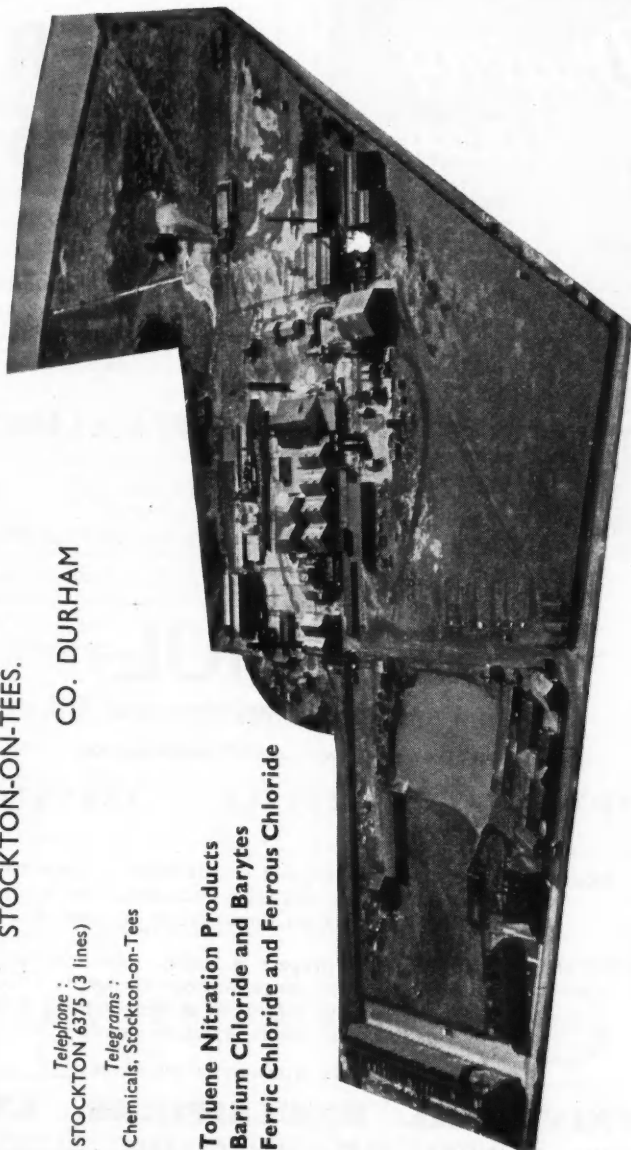
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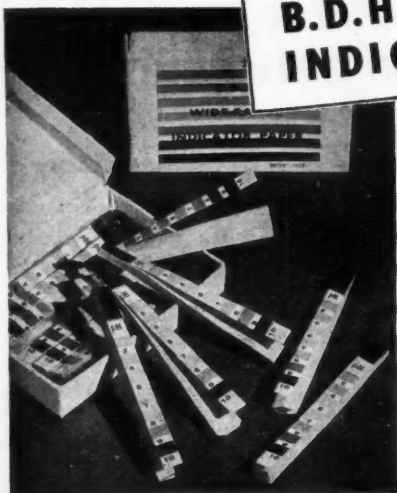
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Poisonous Effluents

THE River Boards Bill, now receiving the attention of the House of Lords, has not come before its time. Although it does little more than enable the Minister of Health and Agriculture to set up river boards which shall conserve water resources and deal with river pollution, land drainage and fisheries, the effects may be far-reaching. In lands wherein there are wide tracks of open country it is still permissible, though not defensible, to pollute the atmosphere and the water courses at will. In an island so densely populated as Britain, such things obviously cannot be permitted. Every works should find a means of rendering its effluents harmless, or better still, of putting them to some useful purpose.

The harm that is done by industrial effluents discharged into rivers in this country is immense. Estuary pollution, as indicated in a recent article in THE CHEMICAL AGE, may prevent migratory fish from moving upstream, and in this way we have lost a very great deal of potential food, notably of salmon. Pollution in other parts of the rivers and streams kills whatever fish normally live there and destroys the amenities of the countryside.

Into the estuary of the Tyne from Newcastle and Gateshead down to the sea are poured every day some 30 million gallons of untreated sewage; official documents reveal, for example, that on five consecutive summer days no oxygen at all was found in the water and that "it was totally impossible for this reason alone for any salmon to ascend or smolts to descend." From the 150 miles of coast-line between Liverpool and Barrow is discharged a minimum of 200,000 gallons of crude

sewage every mile each 24 hours, amounting to 40 large bucketsful every yard daily. Into this cesspool thousands of people plunge in summer months and from it we draw shrimps and prawns. Inland streams are subjected to the same maltreatment. Reference is made in official documents to such things as these: "The bed of the river (once a trout stream) is covered with sewage fungus and there are no fish or weed for seven miles down-stream"; "Although there is a good growth of weed, for 11 miles all animal life is extinct" through effluent from a copper factory. Another river, "smells like a tar-spraying machine."

The facts must be brought home to industry. If too much organic waste is discharged into a stream, the bacteria that operate on that sewage will need all the oxygen contained in the water and there will be none for the fish or plants. If poisonous waste is discharged the animal life will die.

It is true that research has not yet caught up with pollution, especially by industrial effluents, in spite of the good work of the Water Pollution Research Laboratory at Watford. More progress was made during the war than in any other comparable period because so many factories moved into the country and had to purify their effluents or cease production.

Industry must not wait for the D.S.I.R. to do something. The purification of each industry's effluents should be a matter for the industry itself. The gas industry, which to-day has no effluent problem, is an example of how this can be done. We trust that no legislation will be necessary; there is too much compulsion already.

NOTES AND COMMENTS

German Steel and Chemicals

PROJECTIONS, somewhat distorted as shadows generally are, of the proportions of German industry in the years immediately ahead have taken shape as an outcome of the Foreign Ministers' conference in London. Being almost the only tangible result the prolonged and generally acrimonious discussions have brought forth, the agreement to increase the permitted total production of steel throughout the whole of Germany to 11.5 million tons, instead of the 5.8 million tons fixed in the spring of last year, is likely to be remembered as a turning point in the tardy process of reviving German industry. There will inevitably be a good deal of private criticism of the concession for which the British Foreign Secretary has campaigned so long, on the ground that steel in the hands of Germans is as potent an invitation of destruction as the gift of a catapult to a small boy. There are grounds for reassurance in the reflection that 11.5 million tons a year will for several years at least provide no margin of steel beyond the requirements for rebuilding some basic industries, and future international control "for many years" can scarcely prove as inept as our guardianship in the '20s is now shown to have been. The certainty that our own iron and steel industry, even in its present free and productive condition, will have no surplus for Germany in the foreseeable future, even assuming the former enemy were able to pay for it, is another argument for stimulating a policy of self-help. Any steel which can be quickly secured may, moreover, facilitate the transfer of chemical and other plants earmarked for reparations, but apparently little nearer delivery than they were when the scheme was first announced. The last would at least afford more solid satisfaction than the "enormous profits" Britain makes out of current German production and our joint "penetration with American capitalists of the German iron and steel and chemical industries." The fact that no fruit whatsoever seems to have come of either of those policies may be due to the fact that they exist only in the imagination of Mr. Molotov.

Christmas Gift from the Mines

OPPORTUNITIES for celebration are few and correspondingly precious these days. Accordingly there is more than ordinary excuse for applauding the news that has recently come to hand via the Ministry of Fuel, affording as it does an extraordinary contrast with the lugubrious announcements to which we were accustomed a few months ago. This week's figures from the coalfields, showing that 4,356,200 tons were raised by miners and opencast workers in the course of last week are in themselves gratifying enough and the entire picture, taking into account the returns during the past eight weeks or so, goes to show that a sustained effort is now being made which augurs well for the future. The totals during the past three weeks speak for themselves: November 22, 4,245,300 tons; November 29, 4,265,200 tons; December 6, 4,298,700 tons. These, with the subsequent week's further improvement, are fairly conclusive evidence that the new productivity is no mere flash in the pan and the news that exports, small as they are, have started again lends confidence to the hope that heavy chemical industry will not again have to run at half-speed because coal bunkers were empty or nearly so. That is a piece of good news which should be almost as welcome to this country's former Continental customers for chemicals and fuel as it is to us.

Bull-Week

MOST interesting, as a commentary on current discussions of incentives, are the effects of the old-established "Bull-week" tradition which ensures that most miners take home in the fortnight preceding Christmas wage packets which would excite the envy of almost any other manual worker. In the past Bull-week has always been in the nature of a major industrial operation, planned with all the enthusiasm and vigour of the individual miner, each intent upon spending as many hours below (or above) ground as possible. It has, of course, contributed to the current record production. Trade union principles go by the board; only the result matters. The miner is the bull and coal is the red flag. To understand this periodical manifestation of the "Stakhanovite" spirit one

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needs to have been a miner. Among the recollections of Bull-week that persist from wartime experiences at Betteshanger Colliery (writes a correspondent) are of complete cessation of voluntary absenteeism, zealous—even over-zealous punctuality, double-shiftwork on weekdays for workers, such as fitters, electricians, ripers, etc. (none of whom incidentally is an actual producer of coal) and many volunteers for Saturday and Sunday work at overtime rates of pay. Finally, above and below ground there is an atmosphere of tense excitement. Accidents are more prevalent, tempers more highly frayed, and language excessively colourful. But perhaps the most noticeable change in the coalminer's habits is seen in the changing rooms, where coal-blackened work "duds" are whipped on with alacrity to the accompaniment of banging locker doors and the hurrying footsteps of earlier arrivals. What a pity we cannot have "Bull" years!

Products of Furfural

FURFURAL, whose derivatives via hydrogenation form the subject of an important study by Prof. Raymond Paul of which abstracts are presented in this issue, is one of those most abundant and versatile natural materials which inexplicably have received less scientific attention than they deserve. It is fortunate that in the years in which scientific commerce with the Continent was entirely suspended one French chemist at least has brought together and substantially enlarged the body of information about the wide chemical potentialities of furfural, to which he

himself was one of the principal contributors. In its wider presentation now it provides, incidentally, another token of the substantial fruits of independent research in various parts of the Continent during war which only now are coming to light and which may render the present decade more notable than most of its predecessors because of the diversity of methods and objectives which research in isolation—almost *in vacuo*—has fostered. Apart from the more highly evolved derivatives with which Prof. Paul is chiefly concerned, the host of forms of furfural having immediate industrial uses—as an aromatic, antioxidant, gas purifier, medium for insecticide, antiseptic, fungicide more potent than formaldehyde, and valuable aid to dyers and tanners—to mention but a few, strongly suggest that with its ready availability wherever large cereal crops occur this material will richly repay all the research that is given it.

MOISTURE MEASUREMENT

IN the face of a growing demand for a simplified device for measuring moisture content of air and gases in industry and research, Pittsburgh Electrodryer Corporation, Pittsburgh, manufacturers of dehumidification equipment, are now manufacturing a new dew-point apparatus. The company's research department in a report on its work, states that the results obtained with this apparatus compare satisfactorily with more complicated and expensive methods already in use. The Electrodryer device is also claimed to be less liable to error than the wet and dry bulb method, particularly at dewpoints below 0°C.

Parliamentary Topics

Fertiliser Subsidies.—The total cost of subsidies on fertilisers in the year ended June 30 was £6,845,000, divided between phosphates £4,775,000, potassic fertilisers £1,270,000, nitrogenous fertilisers £800,000.—Mr. H. Wilson.

Potash Adequate.—Supplies of potash for farmers' requirements next spring should suffice to meet estimated requirements if no unforeseen transport difficulties occur.—Mr. J. Belcher.

New Sheet Steelworks.—The cold reduction plant in South Wales for sheet steel is to be sited at Margam adjacent to the new hot strip mills there which have already been approved. This will involve the transfer of certain work now being done at the Orb Works, Newport.—Mr. G. R. Strauss.

Metallurgical Coke for Steel Industry.—Supplies of metallurgical coke for blast furnaces throughout the winter months had been scheduled at the rate of 199,000 tons per week. Although deliveries have been increased to a record level, supplies are still running somewhat below the programmed figure. Steps are being taken to remedy this situation.—Mr. G. R. Strauss.

CELLULOSE PLANTS FOR ARGENTINA

AN Argentine company has announced its intention of building two factories with a combined capacity of 35,000 metric tons per annum, for the manufacture of cellulose and its by-products. One plant, which is to be located in the Territory of Misiones, will use pinewood from forests in Northern Argentina to produce material for strong paper and paper bags for cement, floor, etc. The other will be erected at Zárate in the Province of Buenos Aires, for the manufacture of timber-based cellulose.

P.R.A. Appointments

Officers elected for the new session of the Paint Research Association are as follows: President.—Mr. J. W. Cole; vice-presidents, Prof. H. V. A. Briscoe and Mr. T. T. Walton; hon. treasurer, Mr. D. L. Annand. The seven vacancies occurring on the Council have been filled as follows: Messrs. N. A. Bennett (Griffiths Bros. & Co. (London), Ltd.); E. J. Bond (Goodlass, Wall & Lead Industries, Ltd.); A. E. Jones (Leyland Paint & Varnish Co., Ltd.); F. E. Morley (Postans, Ltd.); C. J. Stopford (British Titan Products Co., Ltd.); S. E. K. Thornley (Thornley & Knight, Ltd.); and W. E. Wornum (Mander Bros., Ltd.).

Official Notices

Non-ferrous Semi-manufactured Material.—The Ministry of Supply announces that, from January 1, 1948, its stocks of non-ferrous semi-manufactured material will be disposed of in bulk lots from time to time by competitive tendering. Any firm wishing to tender for this class of store, and not already on the Department's list of firms eligible for invitation, should apply to the Directorate of Disposals/N.F.M., Room 354, Great Westminster House, Horseferry Road, London, S.W.1. Issue of the National Stock List of Ministry-owned non-ferrous semi-manufactures will be discontinued.

Control of Toilet Preparations.—The Board of Trade announces that it has been decided to retain the control upon the manufacture and supply of toilet preparations until June, 1948, when the position will be reviewed again. The rate of licensing from January 1, 1948, to June 30, 1948, will remain at 75 per cent of standard period production and the export bonus scheme will continue in its present form. New licences for the period commencing January, 1948, will not be issued, the Board having decided to extend the date of validity of the licences at present held by manufacturers and to increase the value of those licences by an amount equivalent to the normal "quota" for the period ending June 30, 1948.

PORTUGUESE MARKET

ACCORDING to the Canadian Government periodical *Foreign Trade*, there is a good market in Portugal for all basic chemicals for industrial and pharmaceutical uses. Nitrogenous fertilisers are particularly needed. A ready sale can be found for natural and artificial pigments, while similarly imported sales can readily be made of all types of varnishes, paint bases and zinc oxide.

Many manufacturing industries are protected by a high tariff, such commodities as cement, copper sulphate, calcium carbide, glassware and wrought iron are largely independent of foreign supplies.

Highest Coal Output Since 1940.—Despite a drop of 51,100 tons in outcrop coal, last week's total production of 4,356,200 tons was an increase of 59,500 tons on the previous week, and the highest since August, 1940. Altogether 189,435,800 tons have been produced this year, and since the Ministry of Fuel and Power is said to be including the week ending January 3, 1948, in the 1947 year, the 200 millions may yet be reached.

U.S. Chemical Companies Challenged

Disputed Ownership of Foreign Groups : Cellulose Trust Alleged

THE disposition of chemical and other important industrial holdings now vested in the U.S. Department of Justice as a result of the wartime activities of the Office of Alien Property seems likely to depend upon a decision now awaited from the U.S. Supreme Court. That decision relates to an action by the Swiss Uebersee Finance Corporation against the Department of Justice for some small properties seized by the Office of Alien Property.

Should the Supreme Court's decision bar suits for the return of property seized by the Government from nationals of non-enemy nations, it is almost certain that the Justice Department will institute proceedings to dispose of its \$60 million holdings in the General Aniline and Film Corporation.

Counsel for Uebersee is contending that although the Office of Alien Property was authorized to seize alien property, Section 9 (A) of the Trading with the Enemy Act entitles Uebersee, which was not an enemy, to recover the property by suit. The Department of Justice contends that the first War Powers Act of 1941 entitles it to vest and retain all property belonging to foreign nationals.

In practice, the Office of Alien Property has seized non-enemy property only when it believed that the ultimate ownership was actually vested in enemy nationals, as for example the German Von Opel motor manufacturers.

Swiss Interests

Should the high court find for the Department of Justice and bar suits for recovery of alien property, nothing will prevent the disposal of General Aniline. Ninety-seven per cent of the common stock of General Aniline is claimed by I.G. Chemie, a Swiss Corporation, and, while it has not yet instituted a suit for return of its interest, it is almost certain to do so if the Supreme Court upholds Uebersee's claims.

General Aniline has three main divisions in the U.S.; the General Aniline Works Division, manufacturers of dyestuffs and chemicals, with plants at Rennselaer, N.Y., Linden and Graselli, New Jersey; the Ansco Division, manufacturers of photographic supplies and equipment at Binghamton, N.Y.; and the Ozalid Division, manufacturers of sensitized materials for reproduction of drawings and blueprints at Johnson City, N.Y.

Meanwhile, operations of the company are continuing and last week one of the more elaborate displays at the 21st Exposition of Chemical Industries in New York was that

of the General Aniline Corporation, which displayed its photographic and ozalid equipment and supplies, together with a collection of detergents and dispersing agents.

E.I. Du Pont Attacked

U.S. Charge Mentions U.K. Cellulose Firms

E.I. Du Pont de Nemours, Inc., of Wilmington, Delaware, has been accused by the U.S. Department of Justice of conspiring to monopolize the cellulose sheet industry. If the suit is substantiated, Du Pont may be compelled to sell some of its factories.

Six other concerns, all of foreign origin, are alleged conspirators, though they are not defendants. Their names are: British Cellophane, Ltd. (U.K.), the Viscose Development Co., Ltd. (U.K.), Canadian Industries, Ltd. (Canada), La Cellophane Société Anonyme (France), Kalle & Co. (Germany), Société De La Viscose Française (France).

The allegation made by the Attorney General is that the company has created a monopoly by cartel agreements with interests overseas. This would represent a breach of the U.S. Anti-Trust Law. In support of the accusation, the Department of Justice claims that by cartel agreements world markets had been allotted between Du Pont and leading foreign cellophane makers, and provided for exclusive interchange of technical information "between Du Pont and its co-conspirators."

AUSTRALIAN URANIUM ?

INVESTIGATIONS into methods for the chemical concentration of uranium from low-grade secondary phosphatic ores from Mt. Painter, South Australia, were referred to in the recent annual report of the Australian Council for Scientific and Industrial Research. An acid leaching process for the differential solution of torbernite from manganiferous ironstone has been devised and extended by a study of the many variables involved. Dissolved uranium, says the report, is being recovered by specific precipitation.

Re-equipment of Technical Institutes.—

L.C.C. technical institutes and polytechnics will receive replacements of worn-out machinery and equipment to the value of about £256,000 if the recommendations of a special sub-committee are accepted by the L.C.C. Education Committee.

Visiting Scientists

Subsistence Grants by British Council

THE British Council has for some time had a small fund from which grants have been made in exceptional cases to permit the attendance of foreign scientists (including agriculturists, engineers and medical men) at national or international conferences or meetings held in the United Kingdom. The principal grounds upon which such grants have been made are: (a) that the application has been received from the body convening the conference or meeting; (b) that the Science Committee of the British Council has supported the application; (c) that the foreign visitor would be unable to attend without assistance.

The grants cover subsistence or part-subsistence in the United Kingdom during the period of the conference or meeting. Fares to and from the U.K. are not included. No grants are made in respect of secretarial or other organising expenses, or for entertainment of delegates or hire of premises.

Sponsored Applications

Conveners of conferences or meetings to be held in the fiscal year 1948-49, says the British Council in a Press note this week, are advised that it is necessary that applications for assistance to foreign visitors should be received not later than January 31, 1948. All applications will be considered together, and conveners will be notified of the results by the end of February, 1948. It is improbable that more than a small proportion of applications can be met from the fund. Applications with full particulars (including reasons why financial support is considered necessary) should be addressed to the Administrator, Science Group, British Council, 3 Hanover Street, London, W.1.

PATENT RIGHTS

THE Patent Office has published details of a number of patents which, it says, were endorsed "Licences of Right" and points out that anyone claiming the endorsement is contrary to a contract in which he is interested is at liberty to apply to have the endorsement cancelled, paying a stamp fee of £2 at the Patent Office. Among the patents concerned are: No. 467,510, grantee Howards & Sons, Ltd., and another, manufacture and application of a plasticising agent for cellulose derivatives; No. 557,436, grantee Wingfoot Corporation, production of propionitrile; No. 561,389, grantee Siemens Brothers & Co., Ltd., the stabilisation of a direct current voltage.

Tin Prices Increased

Licensing Restrictions Withdrawn

A MINISTRY of Supply announcement states that as from December 17, the price of tin metal of 99.99.75 per cent tin content will be raised from £437 to £510 per ton (f.o.b. U.K. port or delivered to consumer).

Prices of other grades have been varied as follows:—Refined tin 99.75 minimum from £438 10s. to £513 10s.; 99.9 per cent minimum (in 28 lb. ingots) from £443 to £518; grain bar tin, from £457 to £530; granulated tin, from £462 to £525. The customary extras for small lots, packing, etc., will apply.

The restrictions on the granting of licences to U.K. consumers which have been in force for November and the first half of December are now withdrawn, and applications for such licences will, until further notice, be granted in full at the new prices now announced.

CANADA'S IMPORTS

THE value of Canada's imports from the U.S.A. during the nine-month period ended September 30, 1947, amounted to \$1468.2 millions—greater than any twelve-month period in the commercial history of the two countries, states *Foreign Trade*, a publication of the Department of Trade and Commerce, Ottawa. This compares with \$1405.3 millions in the whole of 1946, and with \$1447.2 in 1944—the previous peak year.

Purchases from the U.S.A. during the 1947 nine-month period represent 77.4 per cent of the total domestic imports from all countries which were valued at \$1896.2 millions. 60 years ago, only 44.6 per cent of Canada's imports came from the U.S.A., and 40.7 of the remainder came from the U.K.

To Aid Nazi Victims

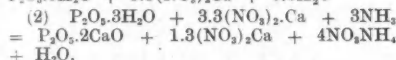
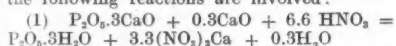
The first shipment of "non-monetary gold" from Germany destined to aid the victims of Nazi persecution is *en route* to the United States aboard a U.S. Army transport, the Preparatory Commission for the International Refugee Organisation has reported from Geneva. The shipment includes jewellery, china, silver, rugs, watches, and even valuable postage stamps which could not be traced to their owners. It will be sold in the United States and the proceeds will be used for resettlement and rehabilitation of refugees. The ship also carries some of the 20,000 refugees to be received by Canada.

Compound Fertiliser Manufacture

Description of New French Method

FRENCH manufacturers give the name "complex fertilisers" (*engrais complexes*) to the product resulting from treatment of phosphorites with nitric acid in the presence of a small amount of water. This causes two molecules of calcium oxide soluble in water per molecule of phosphoric anhydride rendered soluble, to be left in the complex; treatment of excess nitric acid with ammonia to form ammonium nitrate follows, the process being completed by the incorporation of a potassium salt.

In the case of phosphorites such as those from Morocco, which consist mainly of tricalcium phosphate and calcium carbonate, the following reactions are involved:



Eliminating Calcium Nitrate

Owing to the undesirable hygroscopic nature of the calcium nitrate, it is necessary to eliminate this component. Addition of a potassium salt, such as the chloride, results in a double decomposition with ammonium nitrate, yielding potassium nitrate and ammonium chloride.

In *L'Industrie Chimique* 1947 (9), 34, 165-7, M. Quanquin, after a general introduction as above, describes the two methods used for production of these fertilisers before the war—those of I.G. Farben and Odda Smeltwerke—and the new P.E.C. process developed in France between 1939-1945 by the Soc. Potasse et Engrais Chimiques.

In the I.G. process the presence of calcium nitrate is avoided by treating the natural phosphate with a mixture of nitric and phosphoric acids whereby excess calcium is fixed as bi-calcium phosphate; by subsequent treatment with ammonia a product consisting essentially of bi-calcium phosphate and ammonium nitrate is obtained. Owing to the use of phosphoric acid made by the wet method, a considerable amount of water is left in the product after ammonia treatment; evaporation is, therefore, necessary before granulating, etc.

The Odda process eliminates the calcium nitrate by other means. After reacting with an excess quantity of nitric acid the liquor is thoroughly cooled, and since calcium nitrate is much less soluble at a low temperature, a part of it crystallises out and may be removed. But it is not necessary to remove all the nitrate because some is required for forming bicalcium phosphate

during the ammonia treatment. If, for example, Morocco phosphate is used, removal of about 40 per cent will suffice. The Odda process may be said to have the following disadvantages: Preliminary calcination of the phosphorites is essential; part removal of the calcium nitrate involves the use of elaborate and expensive apparatus.

French Practice

In the new French P.E.C. method, the phosphorite is reacted with a mixture of nitric and sulphuric acids, the amount of the latter being so determined that all the calcium not required eventually as bicalcium phosphate is fixed in the form of calcium sulphate. The final product is similar to that from the other two processes, except that it contains up to about 15 per cent of calcium sulphate. The presence of this latter imparts to the magma a thick pasty consistence which increases during ammonia neutralisation; and if the amount of water in the sulpho-nitric mixture has been suitably chosen, the ammoniated product will be sufficiently viscous to be granulated without further drying or evaporation other than that caused by the heat of reaction during ammonia treatment.

The process may be varied by the use of nitric acid alone, potash being introduced in the form of sulphate after ammoniation. Double decomposition then takes place with formation of potassium nitrate and calcium sulphate. The result is similar to that of the first P.E.C. method, all the calcium nitrate not required to form bicalcium phosphate being converted into calcium sulphate, but without the use of any sulphuric acid.

Little Apparatus

In either case, the P.E.C. method is remarkably simple and involves no intricate chemical or physical operations or the use of expensive apparatus. For example, in the manufacture of 100 tons per day of granulated fertiliser the P.E.C. method needs no more than a total of 10 cu. m. of apparatus, as compared with 300 cu. m. for the I.G. process. It must, furthermore, be again emphasised that stainless steel or other corrosion-resistant material is essential. There are also considerable labour-saving advantages. In designing the P.E.C. plant with a view to reducing size and complexity, several new patented ideas have been incorporated. Various advantages are claimed for the mixed fertiliser, usually of the 10-10-20 type, including good storage and anti-hygroscopic effect of the calcium sulphate.

Isotopes for Research

Loans to U.S. Laboratories

MORE than 100 stable isotopes of 29 elements are now available for distribution to research laboratories in the United States, the U.S. Atomic Energy Commission has announced. This, it is pointed out, will speed exploration of the structure of the atomic nuclei and basic understanding of highly important scientific problems. The isotopes can be used as tracers in medical, biological and agricultural studies, as starting material for production of radioisotopes, for spectroscopic studies and for studies of nuclear behaviour under bombardment. The stable isotopes will be furnished to laboratories on loan; the supply is limited and production cost rather high.

Distribution of stable isotopes will be in addition to distribution of radioisotopes which was started in August, 1946, and which totalled approximately 1500 by December 1.

Italian Chemical Prospects

Active Research

THE Istituto di Recherche chimiche Montecatini, at Novara, Italy, has now been completely re-organised and is working on a full programme in its various departments. Another laboratory for agricultural research has been established at Signa, and new products already introduced, such as the anticryptogamic "M" which effectively replaces copper sulphate, the insecticide Cuparsen based, as its name implies, on copper arsenate, and the A.L.M. fungicide.

Montecatini Increases Output

The board of the Montecatini group of Italian chemical and mining undertakings decided at a recent extraordinary general meeting of shareholders in Milan to increase the share capital in two stages from 12 to 24 milliard lire. The board viewed the future optimistically.

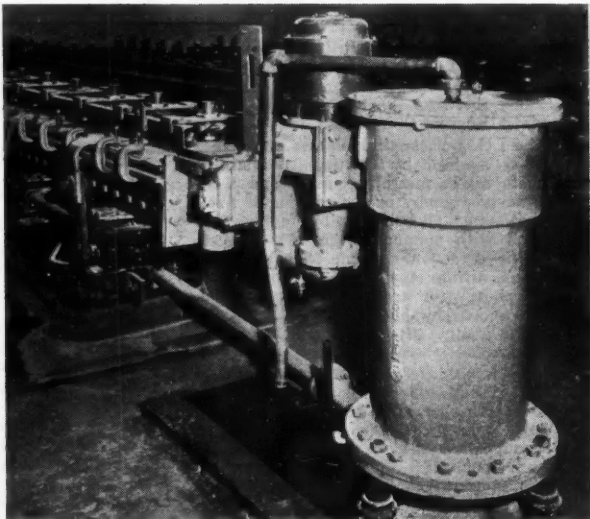
ELECTROLYTIC CAUSTIC SODA : LATEST EQUIPMENT

ONE of the more important of the progressive ideas contributed by American chemical engineering, the stationary mercury cell for the electrolytic production of pure 50 per cent caustic soda (THE CHEMICAL AGE, p. 230, August 16) promises to have a wider application than most. The layout of the plant is now made apparent by pictures from Canada, of which this one shows the installation at the Aluminium Company of Canada, Arvida, Quebec.

The long horizontal chamber is the electrolyser, in which brine is decomposed to form sodium amalgam and chlorine gas. The mercury cathode flows in a sloping channel at the bottom of the chamber; the graphite anodes are suspended from the top at regular intervals. From the electrolyser the amalgam is transferred, by means of the intervening conical pump, to the top of the vertical decomposing chamber (in the foreground). Here the sodium of the amalgam reacts with water, which enters at the bottom and forces its way upward in a very thin film between the amalgam anode and

the graphite packing cathode, to form caustic soda and hydrogen gas. The mercury, practically freed of sodium, flows back into the electrolyser.

The process was developed by the Mathieson Alkali Works, Inc., of New York, with collaboration from the engineering staff of the Aluminium Company of Canada.



Decomposition chamber and the long electrolyser assembly

Corrosion in Sulphuric Acid Towers

Further Study of Acid-Lead Behaviour

A FURTHER contribution to the continuous study of lead corrosion in sulphuric acid towers has been made by Perkold and Müller which is summarised in *L'Indust. chim.*, 1947, 34, 195-6, October. The various factors governing corrosion considered here include free nitric acid, chlorides, nitrous product content and temperature, and quality of the lead used. Varying extent of lead corrosion in different parts of the plant was also studied.

Two kinds of corrosion are distinguished with different rates of hydrogen evolution: (a) formation of a surface layer with black sub-stratum, and (b) a dirty white layer of lead sulphate.

Under certain conditions both types of corrosion may occur together, (a) forming a protective layer under (b); also in some cases the (a) type may change in a comparatively arbitrary manner quite unforeseen into type (b) at temperatures in the neighbourhood of 80°.

Both laboratory and works tests and appropriate apparatus, with controls, are described in some detail. Free nitric acid present in relatively small amounts is generally without appreciable effect on corrosion with the large quantities of nitrogen oxides (NO and NO₂) used in the reactions.

Two Corrosion Layers

It is concluded that the presence of small impurities in the lead made little difference, contrary to the views of Heckler & Hanemann, and that a far more important factor is temperature. But the most interesting results appear to be the nature and significance of the two kinds of corrosion layer.

In order to determine the conditions under which corrosion ^a occurs it is necessary to understand the nature and constitution of the surface layer and of the metallic lead immediately beneath. Under the microscope the protective layer consists of a thin film of transparent rhomboidal crystals, and its formation is mainly due to action of hydrogen in somewhat strong concentration whereby the lead surface is changed into a blackish sponge-like structure. This provides a kind of skeleton or porous medium in which the crystalline protective layer is deposited, consisting of crystals or grains of both light and dark appearance.

The cohesion of this last protective layer with the spongy substratum is remarkably strong, much more so than the layer of lead

sulphate with the basic metal in the — type

of corrosion, where cohesion is purely mechanical.

The relatively strong concentration of hydrogen required to form the spongy lead

layer depends on the speed of reaction which increases with temperature; and depends also on a certain electric potential between the lead and the hydrogen.

If this is so, corrosion ^b should occur preferentially at low temperatures when corrosive action is slight, and the potential between lead and hydrogen is eliminated by some factor or other. Both the effect of temperature and of alloying elements (in the lead) could thus be explained. The unforeseen change of corrosion type (a = b) under a given temperature and quality of lead would then appear to be due to elimination of potential as between the lead and hydrogen. The effect of metallic impurities on potential was long ago noted in Abeggs Handbuch 1909.

SELF-HELP IN INDUSTRY

WHILE expressing confidence in Scotland's ability to make an increasing contribution to U.K. export trade—despite present difficulties—Sir Steven Bilsland, Bt., in an address last week to the Glasgow branch of the Incorporated Sales Managers' Association, warned against developing "a control complex," and waiting for a Government lead when in a difficulty. The more the Government could be kept out of business the better, declared Sir Steven. It had its important functions to perform, and they are necessarily greater than before the war. But industrial progress depended upon our own efforts, hard work, and raising standards of design, quality, and finish. Prices must be right. Britain's future depended not only upon Britain's exporting industries, but on every industry.

Easing Export Licence Situation

One of the subjects which a deputation from the National Union of Manufacturers discussed with Mr. Wilson, President of the Board of Trade, at their meeting on Monday last, was the difficulty of obtaining import licences from overseas countries. Mr. Wilson gave an assurance to the deputation, which was led by Sir Patrick Hannon, M.P., that every effort was being made to ease the situation by negotiation.

River Cleansing Experiment.—The River Rheidol, after having been polluted for years by lead mine workings in the Rheidol Valley, has had 2000 yearling fresh-water trout placed in the river. This will test the efficacy of experimental cleansing work which has been carried out with the co-operation of the Science Department of the University of Wales.

American Chemical Equipment

Much Progress in Automatic Control and Processing

From Our New York Correspondent

ON the basis of a heavy volume of orders taken and the large numbers of inquiries and requests for information received from more than 50,000 visitors, exhibitors at the 21st Exposition of Chemical Industries, last week at New York's Grand Central Palace, reported strong evidence of contemporary and continuing industrial development.

Visitors at the show represented every State in the Union and many foreign countries. They saw some impressive advances in chemical substances and processing equipment, and especially in the greatly enlarged scope and adaptability of the facilities to sustain established manufactures and encourage new ones. New equipment for the chemical industry and many war-time developments were seen for the first time.

An aspect emphasized by a number of exhibitors in the instruments group was the

relatively great attention paid to laboratory instruments and equipment. This was interpreted as an indication of increased adoption of the scientific approach to chemical manufacturing problems.

More new items of stainless steel were shown this year than ever before. They consisted of flared and flareless fittings; unbreakable, explosion-proof Dewar flasks for the laboratory; a range of valves and fittings made of a grade of stainless steel having a maximum carbon content of .07 which is finding wide application in the chemical and paper industries, as well as in other industries having corrosion problems; stainless steel, as well as aluminum packages which reduce the weight of shipping containers, besides being exceptionally strong; lighter and stronger cylinders and pressure vessels developed through cold-drawing of alloy steel. A brand-new con-



The main hall at the New York exhibition

tribution was a group of stainless steel filters for clarification and for the collection of solids, having porous stainless steel filter elements. Porous stainless steel laboratory ware, a porous stainless steel gas dispersion unit and pressure snubbers for the protection of gauges from pressure shock were also displayed. This porous variant is, incidentally, a new achievement in powder metallurgy.

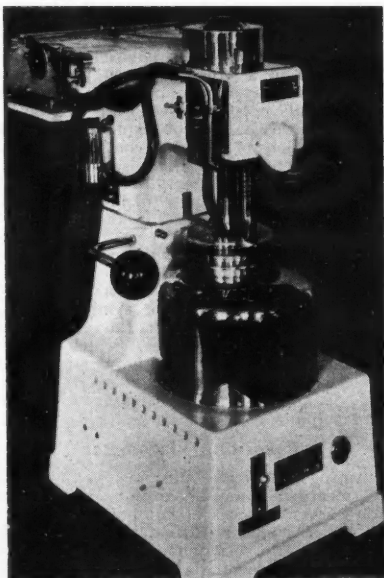
Versatility was the outstanding characteristic of most of the processing equipment displayed at the exposition. Retorts, tanks, towers, grinding and pulverising equipment, screens and separators, proportioning, mixing and treating apparatus, as well as pumps, conveyors, heat exchangers were, in general, adapted to handle a great variety of chemical substances. Noteworthy was the general improvement of design in equipment permitted by the adoption of more highly resistant materials.

Forcing the Pace

Throughout the processing industries there has been a marked tendency to step up the maximum pressures, temperatures and velocities. In line with this trend, one manufacturer of processing equipment, the Sharples Corporation, displayed a centrifuge which develops a centrifugal force equal to 6400 times gravity, enabling it to effect extremely efficient separation even where there is but slight difference in the specific gravity of a mixture's components. This machine has been developed to the point where it will divide a mixture into light and heavy components, and will also separate and continuously discharge solids as well.

Much of the equipment recognises the important part vacuum processing now plays in processes occupying such widely separated fields as penicillin, blood plasma, metal evaporation and sputtering, lens coating and metal sintering. One exhibit concentrated exclusively on single stage and compound vacuum pumps, vacuum-tight valves and vacuum gauges. In the same field, a rotary high-vacuum fractionating still was displayed, operating on a new principle which permits fractionation at high vacuum, and so opens new chemical opportunities. A new industrial monostat was exhibited which is automatic, self-contained and of simplified mechanical construction, which, it is claimed, will maintain constant pressure or vacuum to within 0.1 per cent.

The technique of control and recording has been advanced by several methods for co-ordinating values through electronic amplification of weak signals and electric relay circuits operating various controls. Thus, Milton Roy Co., manufacturers of feeder pumps, employs the Thy-mo-trol electronic system to assure a continuous processing operation by assuring automatic control of the ratio of flow of two or more liquid streams. Applications of this system are



Brabender's viscometer which automatically records time, temperature and viscosity on one graph

found in the manufacture of chemicals, pharmaceuticals, soaps, foods, wood pulp, petroleum refining and other fields where precise control is essential.

If the individual exhibits revealed chemical progress made during the past two years, those in charge of the various booths spoke with optimism as to the future revealing the general spirit of prosperity in which the industry finds itself. Almost all agreed that increased U.S. chemical exports was no longer a matter of getting orders but more one of clearing documents and securing licences to expedite sales of chemicals and equipment to foreign buyers.

Meanwhile, foreign chemical engineers visiting the show reflected widespread plans for enlargement of foreign chemical, glass and food-packing plants, and replacement of Europe's devastated plants.

Germicidal detergents, wetting agents for allaying mine dust, a sulphur dispersing agent for use in the rayon industry, a new sensitised cloth and plastic, the new precision-built Ansco reflex camera and the all plastic Panda camera, together with a full line of General Aniline dyes showing their latest application on nylons, rayons, textiles, leather and plastic, represented the diversity of products exhibited at the show by the General Aniline and Film Corporation.

(continued overleaf)

The wetting and dispersing agents, emulsifiers and detergents presented by the company's Antara Products Division have been developed in a broad research programme. The wetting agent for reducing mine dust is especially important because it is expected to lower the danger of explosions due to concentrations of coal dust and diminish the menace to health of siliceous dust. Among the company's detergents of domestic interest were two new liquid soapless detergents the basic of both being AntaroX A-100, a cleaning compound that permits the incorporation of the increasingly useful quaternary ammonium germicidal compounds. Owing to the general chemical characteristics of all other types of synthetic detergents they would react in the presence of certain other quaternaries, which render both the germicide and the detergent ineffective. AntaroX G-100, it was pointed out, is an excellent dispersant of sulphur and sulphur compounds.

Recording Viscometer

Among noteworthy additions to the range of measuring and recording instruments were several pieces of equipment displayed by the Brabender Corporation of Rochelle Park, New Jersey. They included the Viscomograph, a recording viscometer, capable of increasing or decreasing, at a constant rate, the temperature of a suspension over a range from 20°C. to 150°C., and providing in one curve viscosity and temperature readings. It can deal with light viscous, to fairly heavy, syrupy materials, automatically recording on one graph a combination of time, temperature and viscosity of the material tested at temperatures gradually increasing or decreasing, or at any desired constant temperature, over a range from 20°C. to 30°C., or between 20°C. and 150°C.

A third Brabender production, the Plasto-graph, a highly sensitive instrument measures and automatically records on a graph sheet the consistency of any material from light viscose substances to unvulcanised rubber, and indicates any changes in the structure of these materials due to mechanical abuse, absorption, swelling, addition of ingredients, changes in temperature, etc. The high sensitivity of the machine enables it to react noticeably to a few drops of liquid (a fraction of 1 per cent) added to a mass under test.

Glengarry Machine Works, of Bayshore, Long Island, New York, took this opportunity to show for the first time a laboratory or pilot plant spray dehydrator capable of converting liquid masses into extremely fine powder, down to 5 microns. The laboratory spray dryer removes water or other solvents from a solid, dries a solution almost instantly and the end product requires no further pulverisation. The process is reasonably economical in heat requirements, in time consumption, and requires a minimum

of labour to dry a solid continuously to any moisture content from 0.5 per cent. It has marked potentialities in development work. (1) To determine whether a specific solid can be removed from solution or suspension by spray drying; (2) to test premixed production batches for commercial large capacity driers, by producing small quantities of powder in a minimum of time for laboratory examination and control; (3) to provide a method of producing quantities of powdered products where small quantities are necessary; (4) to produce commercially solid products, manufactured in relatively small quantities, where even small losses are expensive; (5) to remove a small percentage of solvent from molten solid, and to obtain a powdered, cool product continuously and; (6) to dry hygroscopic materials.

Among displays of filtering equipment were Neoprene coated and lead constructed pressure leaf filters and sheet filters especially constructed for the filtration of sulphuric acid spinning baths, vinegar and other corrosive agents. One display featured stainless steel construction in a pressure leaf filter having an area of around 500 sq. ft. Still another revealed an extensive development in the form of a porous stainless steel filter element. Other items employing stainless steel material, were gas spargers, pressure snubbers for the protection of gauges from shock, laboratory ware and Stellite bearings.

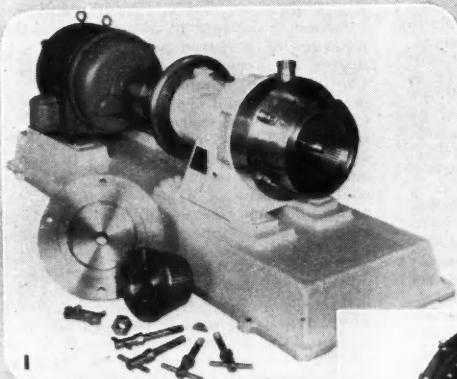
Pressure leaf filters of simple design and easily operated, were displayed by the Hercules Filter Corporation, of New Jersey. A typical filter container is a cylindrical tank built on a horizontal plane with the filter leaves suspended vertically inside. A leaf unit consists of a frame enclosing a heavy mesh middle screen which gives rigid support to finer-mesh screens on either side of it. Besides its supporting function, the heavy mesh screen acts as a spacer for draining the liquid into the discharge channels which are formed by placing several leaf units together.

Hercules also displayed its industrial sheet filter which is available in three standard carriage lengths of 80 frames or less, 50 frames or less, or 30 frames or less. Industrial sheet filters are mounted on either a stationary or movable base designed to allow for expansion of the filter. Standard fittings consist of inlet and outlet valves; sight glass; air vent; pressure gauges; steam valve and drain cock.

New Asbestos Filter

An ingenious principle employed by F. R. Hormann & Co., Inc., New York, was seen in a new asbestos filter of the inside eye type, in which the pads or other filter media act as the sealing gasket, eliminating the use of rubber washers and permitting higher operating pressures.

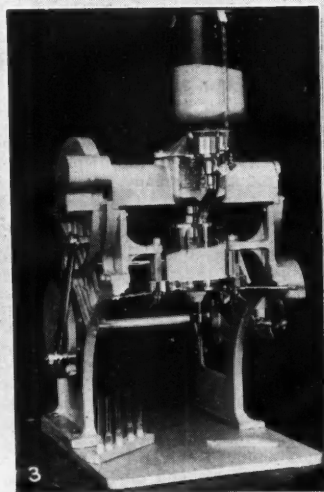
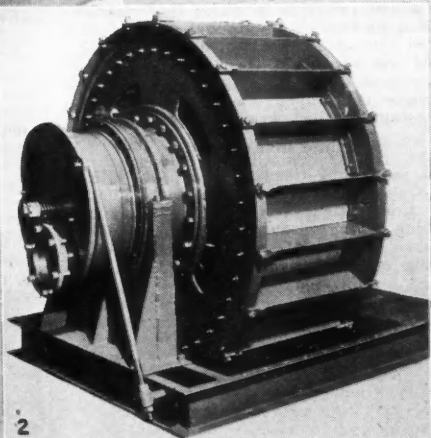
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NEW U.S. EQUIPMENT

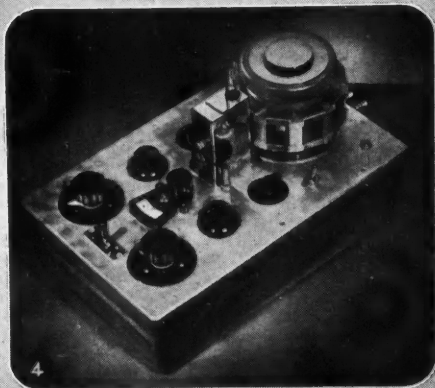
1. Charlotte colloid mill for finely dispersing, disintegrating and homogenizing immiscible liquids, etc. (Chemicolloid Labs.)

2. Stainless steel top-feed dryer (Eimco Corp.) for all fast-settling material



3. Standard equipment for filling ampoules or vials with fine powders or chemicals (Automatic Weighing & Packing Machine Co.)

4. Kromatrol photometer (Will Corp.), able to determine the copper content of brass in three minutes



Chemicolloid Labs, Inc., New York, had on display the Charlotte Colloid Mill, a high speed disintegrator and emulsifier, in which immiscible liquids, liquids carrying solids in suspension, and pastes are finely dispersed, disintegrated and homogenised. The mill consists of a grooved conical rotor which rotates within a corresponding stator, the clearance between them being regulated by a calibrated external adjustment device. The mill has found wide application in food processing, chemicals, cosmetics, pharmaceuticals, paints and pigments, polishes, inks, asphalt and tar, insecticides, adhesives, oils, dyestuffs and rubber.

Among many displays of demineralisers and water still equipment, the Barnstead Still and Steriliser Co., Inc., of Boston, revealed in their Type "R" water demineraliser a new principle in which the water is purified by flowing up through beds of improved synthetic resins which strip out dissolved ionised solids. The water produced is mineral free. Another product by the same company automatically maintains a constant distilled water supply.

Made in England

An interesting display of ampoule filling and sealing equipment by the Chase Equipment Corporation, of New York, included a machine having an automatic hopper feeder attached to the inlet for automatic bulk feeding of ampoules. The ampoules are loaded on a special inclined conveyor rack which carries them in an inclined position ready for filling and sealing from one end of the machine to the other. The moving conveyor rack repeatedly picks up all ampoules automatically injecting a measured quantity (from $\frac{1}{2}$ to 5 cc.) of solution. The sealing operation is performed in three successive stages by burners while ampoules are rotated by spinners. Another piece of equipment by the same company can pack 100,000 units of penicillin at a tolerance of 1 per cent or less, or 20,000 units within a tolerance of 5 per cent. The machine can be taken apart completely for sterilisation and permits insertion of inert gas for filling of hygroscopic powders. This machine is made in England by the Automatic Weighing and Packing Machine Company and is distributed in the Western Hemisphere by Chase Equipment Corporation. The powder ampoule filling machine with bulk feed that was on display has a range of from 12 mg. to 5,000 gram, but can be made for larger capacity.

The Eimco Corporation, Salt Lake City, Utah, showed a working model of a top feed drier available for sodium chloride, potassium chloride, ammonium sulphate, silica sand and other fast settling granular materials such as salt and sand. The material to be dried is fed from the top of the machine, water is ejected as it rotates and drops from the bottom.

The display of the Will Corporation, New York City, is notable chiefly for the Kromatrol Photometer, an improved photoelectric colorimeter capable of measuring the transmittance of coloured solutions with a high degree of accuracy. The light source, a 100-watt lamp, is mounted in a water-cooled lamp housing and the filters are maintained under identical thermal conditions. The ten sets of filters cover a spectral range from 400 to 730 millimicrons in steps of approximately 30 millimicrons. The sensitivity control consists of a twelve-point switch so arranged that eleven different resistance values can be connected to the photocell as its external resistance. A galvanometer with sensitivity of 0.3 micro amperes per division is used as a null indicator when making readings with the potentiometer circuit. When connection between the photocell and the potentiometer circuit is interrupted, the instrument can be used as a simple potentiometer with a maximum range, zero to 2.2 volts. The photometer can be used for the analysis of the percentage of nickel, chrome, copper, or cadmium in plating solutions, and for analysis of any ferrous or non-ferrous material and for copper and brass with close accuracy.

Preservatives and Plastics

Considerable attention was attracted during the exposition to the display put on by Glyco Products Company, Inc., Brooklyn, New York, whose Aldo 33, an edible glyceryl mono-stearate is being used extensively throughout the country to retain freshness of bakery products—particularly bread, and at the same time help conserve shortening. By retarding staling action, Aldo 33 makes it possible to conserve large quantities of bread and release flour for shipment.

Under the slogan, "Plastic and Resins—Born of Chemistry, for Chemistry's Service," the Bakelite Corporation displayed a wide range of materials used by the chemical and allied industries, including new lightweight, unbreakable bottles produced from blow-moulded Bakelite which are resistant to chemicals and oils. The major use of these items is for packaging hydrofluoric acid. Non-drip moulded polyethylene spouts resistant to chemical attack and complex parts moulded from Vinylite and Bakelite plastics that will not oxidise, harden or crack were among other Bakelite products of chemical interest. The latest development in protective coatings include lacquer formulations to produce rapid drying coatings which offer superior resistance to alcohol and water with a high depth of lustre. A new electric flow meter for measuring, recording and controlling the rate of flow as well as the integrated flow of fluids is one of a group of major scientific developments shown for the first time by the Engelhard Industries.

Railway Company's Research Record

L.M.S. Review Marks the End of an Era

THE L.M.S. Railway, on the eve of losing its identity within the comprehensive regrouping of the "British Railways," has provided a record in "The Scientific Research Department of the L.M.S." of the present advanced stage of development of its chemical and physical research establishments, the foundation of which was the chemical laboratory, the first of its kind, opened in Crewe in 1865.

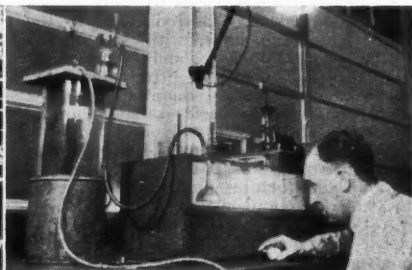
Pictured here are some aspects of the research being carried on at London, Glasgow and Derby, destined in all probability ultimately to be merged in a centralised railway research establishment. Any such headquarters of research will have high traditions to maintain, since railways were among the earliest industries to recognise the gifts chemistry and physics had to confer in promoting technical development and they produced much original work of great value to other industries as well as their own.

Of this there have been many examples, such as the process developed and patented in 1889 by Archbutt and Deeley for "Softening and Clarifying Water and Apparatus therefor." The principle involved is still used to-day in a number of water softening

plants. In 1891 a patent was granted to the same two inventors for a process to "Prevent the Formation of Adherent Deposit in the Feed Apparatus of Steam Boilers," in which the products of combustion of carbonaceous fuel were used for impregnating softened water to prevent after-precipitation.

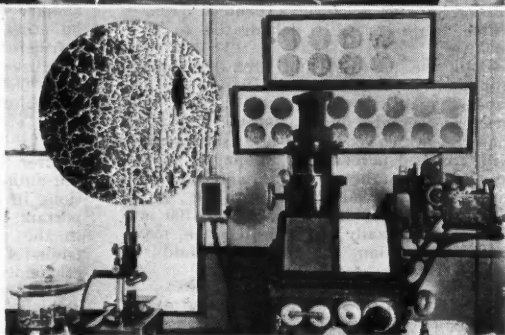
In 1893 Archbutt and Deeley patented their "Improvements in the Purification of Sewage" which incorporated the principles of their two former patents and, in addition, provided for the destruction of albuminoid matter by utilising fuel gases for promoting the development of micro-organisms. Archbutt and Deeley's chief work was, however, the well-known textbook "Lubrication and Lubricants."

It was while working at the Crewe laboratory that Redrop and Ramage developed the sodium bismuthate method for the determination of manganese in steel. This method, which was first published in the *Journal of the Chemical Society* (1895; Vol. LXVII, pp. 268-277) was subsequently much used by analytical chemists, particularly those in the steel industry with which the development of railways has for so long been closely associated.



Above: The general laboratory, Derby; and measuring the viscosity of varnish

Right: One of the L.M.S. workshop and projection microscopes and (inset) a photomicrograph produced —of a defective rail



HYDROGENATION PRODUCTS OF FURFURAL

by PROF. RAYMOND PAUL*

THE many valuable products obtainable from furfural by hydrogenation formed the subject of an important paper read by Prof. Raymond Paul before the Société Chimique de France on October 11. The author, who is well known as Directeur Scientifique de la Société des Usines Chimiques Rhone-Poulenc, has for many years taken a leading part in the widespread research in this profoundly interesting field of heterocyclic chemistry. Here he pauses to survey the vast field of past accomplishment, including many of his own most recent contributions thereto and indicating the approach to further research.

That there is wide scope for this, especially in France, may be gathered from his concluding remarks: "Au surplus, ce ne sont pas les applications actuelles du furfural qui permettront à son industrie de se développer en France. C'est donc, pour nous, une matière première qui reste encore à valoriser."

Starting Point

Students of organic chemistry will doubtless recall their first introduction to the heterocyclic compounds, with the famous trio-furfurane, thiophene, and pyrrol, in all their beautiful simplicity, little thinking to what almost infinite complexities these would constitute the basic skeleton through the magic of catalysis and other methods. They will also recall that the most important immediate derivative of furfuran is the aldehyde, furfural (or furfural as it was then known), obtained then, as now, by dehydration of the pentoses with dilute acid; or one may start with a uronic acid such as glycronic, induce this to part with its carbon dioxide to form a pentose (xylose) which can be readily dehydrated to yield furfural.

Both the pentoses and uronic acids are abundantly distributed in vegetable life, especially in the husks, shells, cobs, and bran of cereals and in straw and other material which is often a waste product, with furfural percentages ranging from 4.66 to 14.4 (in oat bran). This material, especially straw, is said to be available in the U.S.A. to the extent of more than 100 million tons annually, from which the maximum production of furfural would be 6,253,500 tons.

There are no special difficulties in producing furfural. Probably the two best known methods in the U.S.A. are those of La Forge & Mains, and of the Miners Laboratories. Both use concentrated sulphuric acid, but the latter (Miners) uses only 20 kg. steam per kilo of furfural, as compared with 60 kg. for the other.

In Russia the raw material chiefly used appears to be tan, sunflower seed waste, and wood pulp bisulphite lees or similar waste, and an improved method, dry hydrolysis, is claimed. (R. Heublum, *Nitrocellulose*, 1935, 6, 41, etc., also French Pat. 878,611, 1942.)

The material available in France is of course much less. With oat bran, and the straw of maize, barley and rye, the total tonnage in 1940 was estimated at just over 5 million tons, and in 1945 at 2,431,000 tons, capable of yielding 11 per cent of furfural from the oat bran and 6 per cent from the straw, or (estimates): 374,000 tons and 178,000 tons furfural respectively. There is very wide disparity between possible and actual production, which in France is made wider by difficulties of collection of bulky material, the great size of the plant required and similar considerations.

For these reasons little or none is at present made in France, and almost the only countries where it is produced in any substantial quantity are the U.S.A. and Russia. The Quaker Oats Co. was making 30,000 tons before the war, and present capacity now exceeds home needs by about 18,000 tons. Little is known about Russian output, but pilot plants have been erected at Armavir, Krymskaya, and at Odessa. The author acknowledges valuable assistance from Mr. Frank F. McKinney, of the Quaker Oats Co., in supplying data. The bulletins of this company have also been a fruitful source of information on the manifold uses of furfural; and there are besides some 5000 references (including patents) in the voluminous literature of the subject.

Organic Synthesis

After listing some of the principal uses, the author proceeds to consider its applications in organic synthesis, with many important possibilities by hydrogenation, and in the preparation of diols-1,4, and -1,5, triols-1,4,5, and their derivatives, and of diethylenic hydrocarbons.

Hydrogenation is schematically shown (page 795), using copper chromite, Raney nickel, and reduced nickel as catalysts. By

*"Le Furfural et ses Produits d'Hydrogénation" published by the Bureaux de la Société Chimique de France.

100° and pressure of some 19 atmospheres (as described in earlier work by the author and others) which included a whole series of epoxides with their di-bromides and other derivatives including acetates of primary ethylenic alcohols. One of these epoxides has proved to be among the best solvents for polyvinyl chloride (Solvent T) and other possibilities with these derivatives are discussed.

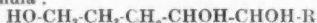
The hydrogenation of furfural to tetrahydrofurfuryl alcohol is an interesting example of the advantages of two-stage working: in this case, first into furfuryl alcohol on a copper chromite catalyst, and then into the tetrahydro alcohol over a Raney nickel catalyst, whereby laboratory yields of 90 per cent are obtainable. This tetrahydro compound serves as a starting point for preparing the diols-1.5 and linear 1.5 derivatives in general. Examples include the acrolein patents of C. L. Wilson and I.C.I. (E.P. 569,625 and 573,507); also I.C.I. French Pat. 911,802. This method of thermal decomposition in connection with some of the halogen derivatives in this class was used by the author (*Comptes Rend.*, 1944, 218, 122).

One of these derivatives is of particular interest, the dihydropryane, since, owing to the high reactivity of the double bond, it could be used in two different methods of preparing the linear 1.5 compounds, such as hydroxy-2 tetrahydropryane—the cyclic form of hydroxy- γ pentanal. But probably the most interesting in this class for organic synthesis are the di-bromides from which may readily be obtained hexagonal heterocyclic compounds by condensation with primary amines (piperidine series), etc.

Triols and Derivatives

Much of the work in this and following section was done during the war years and is therefore possibly not quite so well known as the earlier; and some of it was patented in France by German interests, such as the I.G. Farbenindustrie.

In order to obtain some of the diol derivatives of the previous section it had been found necessary to reduce in some measure one at least of the three strong oxygen links in the furfural nucleus; but for the triols this is not necessary, and it is thus possible to derive not only the pentanetriol-1.2.5 series, but also its homologues of the general formula:



It proved easy to obtain by hydrogenation of furfural the tetrahydro-furfuryl alcohol; also its homologues from the fural-carbinols (alcoyl or aryl). From these epoxyalcohols one may proceed to the acetic triesters of the triols-1.4.5, e.g., by action of acetyl chloride in presence of a small amount of zinc chloride as catalyst; and thence to the triacetins with high

yields—up to 90 per cent reckoned on the initial epoxyalcohol. Or better still, acetic anhydride may be used instead of the acetyl chloride, and at a temperature of 180-200° with zinc chloride as catalyst high yields are again obtained—up to 80-90 per cent.

With the acetic triesters the next step is formation of the triols-1.4.5 by saponification or methanolysis, producing compounds which resemble glycerol in many respects. This applies more particularly to the first member of the series, pentanetriol-1.2.5, which may be easily converted into tetrahydrofurfuryl alcohol by action of acids, dehydrated into pentene-4-ol-1 by heating with oxalic acid, condensed with acetone into isopropylidenedioxy-1.2 pentanol-5, or oxidised into gamma-hydroxybutanal by means of lead tetracetate. From the tetrahydrofurfuryl alcohol the dihalohydrines-1.5 may be readily obtained, e.g. with hydrobromic acid. Further reactions, with heat or alkaline solutions, are noted, with formation of halogenides usually; except when using dry potassium hydroxide in ether medium, when the isomer is formed instead, namely: the epoxy-1.2 halogeno-5 pentane. The arylc ethers of the alcohol treated with the requisite amount of hydrobromic acid yield monohalohydrins, for use in the synthesis of various amino-alcohols (R. Paul, *Bull. Soc. Chim.*, 1945, 12, 368).

Preparation of Di-ethylenic Hydrocarbons

These may be obtained direct from the ethylenic alkyl acetates, or glycol acetic diesters (di-acetates) or from the epoxides already described. Considering first the ethylenic alcohols, and by way of example pentane-4-ol-1, the preparation of which from tetrahydrofurfuryl chloride with alkali treatment is well known, the author (together with H. Normant) has found that, when dehydrated over alumina at 390°, almost equal amounts of pentadiene-1.3 (piperylene) and methyltetrahydrofuran are produced, without any pentadiene-1.4 (divinyl-methane). By pyrogenation of the acetate at about 500° without catalyst yields up to about 66 per cent of divinyl-methane without piperylene. By pyrogenating at 560° on glass wool the ethylenic alkyl acetates a hydrocarbon mixture up to 87 per cent is obtained containing hexadiene-1.4 75 per cent, hexadiene-1.3 10 per cent, and hexadiene-2.4 8 per cent.

Similar treatment of glycol di-acetates gives equally good results; and the epoxides, too, may be directly transformed into dienic hydrocarbons, as was first shown by Guinot, in French Pat. 811,695, in which the furane is passed over aluminium phosphate at 350° and piperylene obtained at yields up to 90 per cent—of considerable interest in rubber synthesis (Eng. Pat. 506,038).

Continued on page 797

New Source of Metallic Chemicals

Reactions Arising in Metal Cutting

MECHANICAL activation, a newly-developed chemical technique that uses a metal-cutting process to produce a chemical reaction, will enable certain organometallic reactions to compete commercially with current methods of synthesis. This information was given by Mr. M. C. Shaw, assistant professor of mechanical engineering at the Massachusetts Institute of Technology, when he addressed a session of the annual meeting of the American Society of Mechanical Engineers in Atlantic City, N.J., last week.

During a study of the basic mechanism of cutting-fluid action, he said, it was found that, when used as cutting fluids, certain organic reagents react vigorously with the metal cut, even though these same chemicals were relatively inert to the uncut metal in bulk.

Of Practical Use

This interesting discovery suggests the possibility of using a metal-cutting process to carry out reactions between metals and liquid or gaseous reactants, and subsequent tests have shown that a metal-cutting process can be used to advantage in starting and controlling certain reactions involving metals. In several cases the metal is consumed as rapidly as it is cut. Such an application of a metal-cutting process is obviously far different from its generally accepted objective of producing finished machine parts of specified size and shape.

Dr. Shaw explained that the organic chemist deals with chemical compounds

possessing metallic elements which are directly bound to atoms of carbon as organometallic compounds. "Inasmuch as the majority of the 96 elements now known are metals, it is evident that a huge variety of organometallic compounds can be prepared. Very few such compounds, however, occur in nature. Organometallic compounds are generally derived within the laboratory by reacting an organic halide compound (an organic compound containing chlorine, bromine or iodine) with a metal or its alloy."

Chemical Principles

The objective of the new process, continued Dr. Shaw, is to produce a chemical rather than a physical product. Even though the end products of these two applications of the metal-cutting process are so different, they both use a cutting tool to accomplish the desired end result.

The metal involved in the preparation is cut in the presence of the other reactants, thus utilizing the high temperature, high pressure, and highly stressed nascent surface produced at the point of cutting to start the reaction.

This new chemical technique, which has been called mechanical activation, promises to give many extremely versatile organometallic reactions a commercial significance which they have hitherto lacked because their application was limited to batch rather than continuous processes by the inflammability and toxicity of the reactants and the difficulty of starting and controlling the reaction.

FURFURAL (Continued from page 796)

Although the method could doubtless be applied to other epoxides-1.4, the author has recently shown that, when the side chain is lengthened, reactions are complicated. For example, on aluminium phosphate at 400° ethyl-2 tetrahydrofuran yielded up to 70 per cent of a hexadiene mixture (-1.4 45 per cent, -1.3 14 per cent, and -2.4 36 per cent).

The author at present has little information on the dehydration of epoxides-1.5, but has found that, under conditions in which tetrahydrofuran is uniformly dehydrated into butadiene, tetrahydropyran remains practically unchanged, thus confirming the difference in stability of the two rings.

Pyridine and Piperidine Syntheses

In this final section the author notes the many attempts to synthesise pyridine in view of its increasing importance, e.g., in

pharmaceutical products, in which some of the best results have been obtained by Natta and co-workers in Italy. Other methods, besides the Russian of Jurjew, include those of the Rhone-Poulenc Co., in French Pats. 880,986 and 898,936; and a new class of piperidines by the author and associates (*Bull. Soc. Chim.*, 1945, 12, 827; and 1946, 13, 385) by hydrogenating a mixture of furfural and a primary amine, with yields of 60 to 80 per cent, according to the nature of the radical attached to the nitrogen atom.

In a concluding note the author suggests the possibility of obtaining linear derivatives of furfural (a) with two functions in gamma or delta, and (b) with three functions. Generally there is still, in his opinion, a vast field for further research for new compounds and industrial and scientific applications both for the new and for those already prepared.

American Chemical Notebook

From Our New York Correspondent

BEGINNING January 1, 1948, the Department of Commerce is to establish greater control over the supply of building materials, brass, bronze, copper and zinc materials to foreign countries by requiring exporters of these materials to obtain special licences. Exporters seeking such licences will be required not only to name the country of destination and the consignee, but will also have to indicate what use will be made of the materials. This is a reversal of previous procedure. Under the old practice it was possible for an exporter to make several shipments of goods to various countries under a single export licence. The change announced by the Department of Commerce conforms to Secretary Harrison's declaration that greater use will be made of export control powers to direct goods in short supply to the sixteen Western European countries which have joined in the programme of economic rehabilitation proposed by the Secretary of State.

* * *

Both government and industry to-day recognise the importance of chemists to the health and well-being of the nation. Dr. Foster D. Snell, president of the American Institute of Chemists, declares. He has pointed out, however, that New York City's Civil Service schedule for professional chemists, prepared in 1937, and still in existence, failed to evaluate chemists properly and in some cases classified them below the salary position of semi-professional workers. The result is that this schedule establishes New York City's chemists' basic salaries at less than half those paid by industry and substantially less than those paid by the Federal Government. Vitally important municipal work, alleged Dr. Snell, is done by a group which is small in number—about 125—and the cost of placing these professional men on a parity with Federal employees will not be great. Pointing out the importance of chemists to public health and welfare, Dr. Snell asserted that sub-standard ratings for chemists will not attract nor keep qualified chemists in service.

* * *

A new synthetic resin developed during the war by the U.S. National Bureau of Standards for use in the electrical field has just been made available commercially. Known as "NBS casting resin," it was used during the war only for military applications such as the radio proximity fuse. Now that the material is commercially available it is expected to find further application in the electronic field in the development of devices such as hearing aids, portable radio transmitters and receivers and industrial

electronic devices. Essential ingredient of the new resin is dichlorostyrene, which was developed and is now being produced by Mathieson Alkali Works.

* * *

A new word—"hypergolic"—was introduced into American scientific vocabulary last week as rocket engineers attending the annual meeting of the American Society of Mechanical Engineers in Atlantic City, N.J., described research with liquid fuels which ignite spontaneously when united in a rocket device. The adjective describes rocket propellant combinations that are self-igniting, as opposed to fuels which must be "sparked" to start the firing process. Hypergolic fuel combinations were discussed at the meeting by engineers of the Aero-jet Engineering Corporation of Azusa, California, and the firm's experiments with nitric acid and aniline self-igniting combinations were also described.

* * *

The Calco Chemical Division of the American Cyanamid Company, has announced its opposition to the current practice of reselling dyes for export at exorbitant prices and has warned clients that it would discontinue sales to those who divert goods into the black market. A letter recently addressed to customers by J. Pfister, manager of the dyestuff department, contains this passage: "For consumers to order dyes for the purpose of resale to black markets is not only a breach of contract but a breach of good faith, and if we can establish any such practice against anyone buying dyes from us, we shall take immediate action and promptly discontinue selling to such parties."

* * *

A new high purity silica powder of sub-microscopic fineness has been developed by the Linde Air Products Co., a unit of Union Carbide and Carbon Corporation, and is now being produced in pilot plant quantities, the company announced this week. Control analyses on the powder show a minimum of 99.9 per cent silica content on a dry basis, with an average particle size of 0.6 to 0.05 micron. It is expected that the powder, which can be used either by itself or dispersed in either aqueous or organic liquids, will find applications in paints, lacquers, rubbers, elastomers, textiles, and lighting. The powder has been found to disperse in, or to blend satisfactorily with, most organic or inorganic substances (including water) and to remain in a stable homogeneous form indefinitely. The extremely fine particles of silica give rise to surface phenomena which make it a suitable catalyst carrier in chemical processes.

Simplified Detection of Toxic Gases

New Rapid and Exact Method

METHODS of detection of various toxic gases which depend upon the use of filter paper soaked in a suitable reagent have long been in regular use. Shortly before the war the Department of Scientific and Industrial Research published a useful series of pamphlets which put the procedure on a more systematic basis. Paper tests were described for H_2S , HCN , SO_2 , $COCl_2$, and CO , using a standard type of paper-holder fitted to an aspirator drawing in between 45 and 55 ml./minute of gas. In some cases a hand-pump is described as an alternative. Many chemists have felt the need of a more convenient apparatus than either the glass aspirator or the pump for these tests. Apparatus requiring refilling with water is often inconvenient and even the running away of water is sometimes a nuisance.

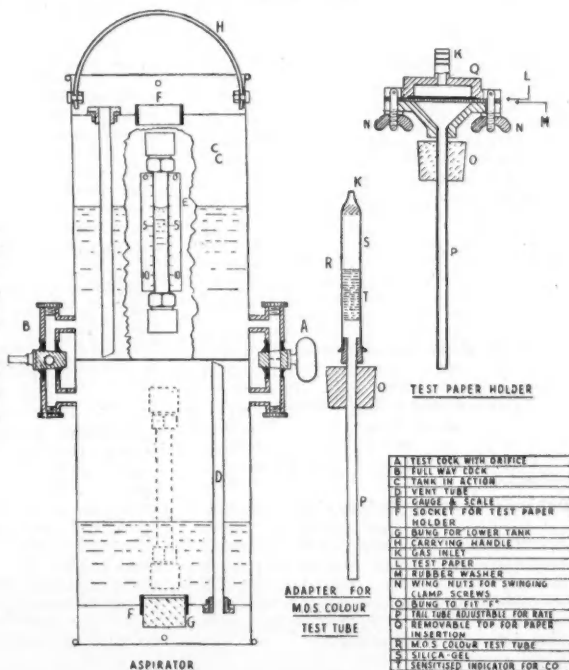
A useful apparatus which overcomes these objections has now been produced, consisting of a metal cylinder divided into halves which are connected so that water can run from one chamber into the other. The connecting channel has a tap in which is incorporated an orifice which, in con-

junction with a "Marriott Bottle" type of construction regulates the flow to 55 ml./hr. for all water levels. For convenience a second inter-connection is provided which has a full-bore tap for rapid emptying.

The sample of gas to be examined enters the apparatus through a paper-holder with toggle-screws for rapid opening: after passing through the paper, the gas is led to within about an inch of the bottom, from where it bubbles to the surface. The level of water is shown by a gauge at the side of each chamber which has an adjustable zero scale calibrated directly in minutes. Thus even if a test is interrupted several times in order to examine the stain on the paper, the level gauge scale records the total time the gas has been passing.

A new application of this apparatus to the detection of carbon monoxide is afforded by the use of the Ministry of Supply "Mark III" detector tube which was developed during the war and is now available commercially. Capable of detecting 0.005 per cent in a two-minute test, it represents a great advance in convenience over any paper test, and is already being used considerably in the gas industry.

One very obvious advantage of the new form of aspirator, the construction and components of which are shown here, is that it is symmetrical, top and bottom, and thus requires only to be reversed when the top chamber is empty



Home News Items

Chemical Society's Library.—The library of the Chemical Society, Burlington House, London, W.1, will be closed for the Christmas holiday from 1 p.m. on Tuesday, December 23, until Monday, December 29.

U.S. Tinplate Price Up.—Carnegie-Illinois Steel Corporation announces that as from January 1 there will be an increase of 85 cents, to \$1.05, per base box of 100 lb. basic weight at Pittsburg and Gary, Indiana.

Strike Notice Withdrawn.—300 process and maintenance workers at Altham coke plant, near Accrington, last week decided to withdraw a strike notice pending negotiations for a 42-hour working week.

Refinery for North Shields.—An oil refinery is to be erected by the Trent Oil Products Co. on a 46-acre site in the docks area of North Shields. The project, which will provide employment for about 200 men initially, is receiving Government backing.

New Chemical Factory for Kirkby.—The Liverpool Corporation has leased about 2½ acres of land and buildings on the Kirkby Trading Estate, to Alexander Rush, Ltd., Hempsshaw Brook, Stockport, dried colour and chemical manufacturers, at the price of £5500.

Lighting a Landmark.—The Royal Liver Building clock, 36-year-old landmark of Liverpool, and largest electric clock in the country, has just started a fresh chapter in its history. After eight years of blackout it is illuminated once again. Six sodium lamps by Philips Electrical, Ltd., are used.

Llandarcy Development.—Provisionally approved plans for the expenditure of £9 millions on extending the refining capacity of National Oil Refineries, Ltd., Llandarcy, near Swansea, are now known to include facilities for tankers and storage at Swansea docks.

Big B.I.F. Bookings.—Exceptionally heavy demands for space are reported for next year's British Industries Fair. In London, applications are said to have exceeded available space by about 35 per cent. The Fair will be held from May 3-14 and more than 3000 firms representing 87 industries will participate.

Dunlop's Scottish Factory.—Dunlop Rubber Co., Ltd., has now begun to install machinery into its new Scottish factory at Dunfermline which may commence production early next year. The factory will employ about 300 workers when working to capacity, and marks a definite expansion of Dunlop interests in Scotland.

Visas Abolished.—A Foreign Office announcement states that as from January 1, 1948, visas will no longer be necessary for travel between this country and Italy.

November Steel Output.—Steel production in November was at the annual rate of 14,174,000 tons, which, though the highest figure recorded for that month, was slightly less than the October rate of 14,316,000 tons.

Chemical Stocks Destroyed.—Stocks of chemicals on the premises of T. & H. Smith, Ltd., manufacturing chemists, 32 Virginia Street, Glasgow, were destroyed when a fire occurred there last week.

Fatal Accidents.—A Ministry of Labour survey of fatal accidents in industry in October reveals that six of the total of 157 occurred in chemical, oil, soap and allied undertakings. The highest number of fatal accidents—25—was in the building industry.

Seeking £100,000.—The Civil Service Sanatorium Society, which was formed in 1905 and was originally known as the Post Office Sanatorium Society, has asked its 250,000 members to assist in subscribing £100,000 required to increase bed accommodation to 220, and to provide up-to-date X-ray and other equipment at the Benenden (Kent) sanatorium.

Developments in Resistance Welding.—A paper reviewing the historical developments of the resistance welding process was read at the East Ham Technical College, Barking Road, E.6, last week by Mr. C. E. Slade, who dealt with basic principles, power supply problems, and modern commercial usage and applications.

Scottish Coal for Sweden.—The first post-war export of Scottish coal—750 tons of industrial small coal—left Methil Docks last week for Stockholm. It is stated that two more coal cargoes—the first consisting of 2200 tons and the second of 3200 tons—will be shipped at Methil for Sweden this month. Before the war, Methil Docks exported up to three million tons of coal annually.

Studying Channel Black.—The Dunlop Rubber Company at Fort Dunlop is investigating, with an electron microscope affording about 100,000 dimensions magnification, the behaviour of carbon blacks and the fact that tyre treads and conveyor belts wear better when the rubber is reinforced by channel black. How this happens is not yet fully understood, and the examination of the compound is handicapped by the fact that each particle of black remains invisible under an ordinary microscope.

Obituary

THE death of Lord Rayleigh at his home in Essex last week at the age of 72 removes one of the most distinguished physicists of the present century and the heir to a scientific tradition which he inherited



The late Lord Rayleigh

from his father, the fourth Baron Rayleigh, O.M., discoverer of argon, and which he substantially increased.

Following service as a research worker in the Cavendish Laboratory and as Professor of Physics at the Imperial College, he published a number of works representing highly original fundamental research on natural subjects, notably in the realms of meteorology, radioactivity and geology, on which much subsequent work has been based.

The third member of his family to hold office as president of the British Association, Lord Rayleigh held many other principal scientific appointments at different times, including the foreign secretaryship of the Royal Society (1929-1934), of which he was a Fellow, chairmanship of the executive committee of the National Physical Laboratory and of the governing body of the Imperial College of Science, and presidency of the Physical Society (1934-36).

Among the many scientific honours awarded him in recognition of his outstanding and original studies was the Rumford Medal of the Royal Society. He achieved almost equal distinction from his literary work, including biographies of his father and of his former colleague at the Cavendish Laboratory, Sir J. J. Thomson. His acute and informed interest in scientific milk production was reflected by the famous herd he maintained at his Terling home and by his former presidentship of the Central Council of Milk Recording Societies.

Personal

The Council of the Royal Society has appointed the following vice-presidents for the ensuing year: SIR THOMAS MERTON, SIR EDWARD SALISBURY, PROF. C. A. LOVAT-EVANS and SIR NORMAN HAWORTH.



Mr. Stewart Douglas, of Sale, Cheshire, appointed a director of the Textile Institute with the special responsibility of forwarding the institute's far-reaching programme of scientific and technical education and research

MR. RAWSON F. STAGG has been appointed assistant managing director of Ketton Portland Cement Co., Ltd.

MR. KENNETH T. BASSETT, of the Dunlop Rubber Company's Birmingham depot, and formerly of the tyre division at Liverpool, Manchester and London, has been appointed district manager for the Rhodesias of Dunlop South Africa, Ltd.

MR. E. S. MCCALLISTER, who for many years has been connected with the electrical industry, particularly with the development of electronic instruments, has been appointed to the electro-medical department of Philips Electrical, Ltd., in London.

Obituary (continued)

SIR WILLIAM COATS CROSS, Bt., of Scatwell, Ross-shire, has died at the age of 70. He was a senior partner in the firm of Alexander Cross & Sons, Ltd., chemical manufacturers, Glasgow and Manchester.

MR. JOSIAH B. LANE, a director of Lancashire Tar Distillers, Lincolnshire Chemical Co. and other companies, has died in London.

MR. F. R. WIX, who was a director of Phosphor Bronze Co., has died at Cheam, Surrey, at the age of 64.

TECHNICAL PUBLICATIONS

ALTHOUGH a certain glass blower is said to have expressed the opinion that chemists know nothing about glass—a belief that can hardly be substantiated—there is evidence that chemists as a whole would benefit from a fuller knowledge of the process of manufacture of glass apparatus. A good driver is not necessarily a good mechanic, nor need he be, but a good understanding of the mechanism of the vehicle he is called upon to drive often proves an advantage. This was the note upon which Mr. Richard E. Threlfall opened his lecture on "Glass Tubing" to a meeting of the London section of the British Association of Chemists at Gas Industry House, S.W.1, last year. The lecture has now been reproduced in the form of a 36-page book, and its value enhanced by the addition of illustrations and tables. Copies are obtainable from the president of the Association, price 2s. 9d. post-free.

* * *

"Present Trends in Nickel Alloys" is the subject of a publication by the staff of the development and research division of the International Nickel Company, Inc., 67 Wall Street, New York 5. It deals with alloy steels, stainless steels, nickel and high nickel alloys, alloy cast irons, high nickel irons, wrought nickel-silver alloys, copper-nickel alloys, nickel plating and with nickel and nickel alloy coinage. A heavy demand persists for alloys of all types to satisfy the needs of the metal industry, for the petroleum and chemical industry as well as for the manufacture of penicillin and other modern drugs.

* * *

As an example of fine printing—in Switzerland—few technical publications can compare with the current issue of the "Sulzer Technical Review" (No. 2), which celebrates the fiftieth anniversary of the Sulzer diesel engine. The main article describes the development of the stationary Sulzer engine, which began in 1897 with the construction of a 20 h.p. unit and has led to the largest modern engines with outputs up to 14,000 h.p. There are also contributions dealing with the two-stroke marine engine, which dates from 1904, and the first Sulzer diesel locomotive. An account is also given of the latest advance from the diesel engine to the gas turbine.

* * *

A 19-page, illustrated booklet of interest to factory managers as well as others whose function it is to provide healthy conditions for employees, has been published by Aerosols, Ltd. Lucid information, often prepared in tabular form for purposes of comparison is given on air sterilisation and pest control.

TINTING STRENGTHS*

THE "strength" of coloured pigment is said by some authorities to be its ability to tint an opaque pigment in the presence of a medium. Air, the most obvious medium, is used in the tinting of dry materials such as face powders. The most common medium, however, is drying oil, as the pigment under test has nearly always to be fabricated into varnishes prepared from such oils; aqueous media are sometimes employed during evaluations.

Draw-downs of drying oil/pigment pastes can demonstrate the different effects of strength obtained by grinding the colour pigment with the white pigment and the medium simultaneously, as opposed to grinding the colour pigment and the oil together followed by the addition of white pigment and further grinding. Differences in strength may also be observed between the same pigment using different amounts of medium to effect grinding.

Irrespective of the strength estimation method employed, the result will be comparative provided the sample and standard pigments are tested simultaneously, *i.e.*, within an hour or so of each other.

The most obvious machine for estimating strength under good grinding conditions is a laboratory-scale three-roller mill.

Automatic Muller

A laboratory-scale machine involving a new principle has been marketed by the C. C. Hoover Co. of New York as the Hoover Automatic Muller. The instrument consists of two concentric, ground-glass plates horizontally mounted face to face, the lower one being directly coupled to a constant-speed motor. The upper plate is prevented from rotating but is mounted on an arm which can be raised or lowered through an arc of 90°. A 2-3 g. charge of colour pigment together with known quantities of white pigment and medium is made on the lower plate. The quantities are roughly mixed together and the upper plate lowered to contact the other and locked in position with a catch.

The mulling action takes place by allowing the lower plate plus the test mixture to revolve under pressure against the upper plate at a constant speed for a definite number of turns.

When a transparent white pigment is used to extend a coloured pigment in the presence of a medium, there is apparently no reduction in strength. It is therefore necessary to evaluate a coloured pigment in terms of whether it was to be used as a tint with an opaque white or as an apparently full-strength colour with a transparent white.

* Abstracts from a recent lecture given by Dr. J. G. Gillan to the Bristol section of the Oil Colour Chemists' Association.

Overseas News Items

Steel Plan for India.—In a statement to the Constituent Assembly last week, Dr. Mookerji, Indian Minister for Industry and Supplies, said that India is to have two major steel plants, each with a capacity of 500,000 tons.

Australian Trading Doubled.—Imports and exports by Australia of oils, fats and waxes were approximately doubled in the past year. Import totals in 1946 and 1947 were respectively £A2.143 million and £A5.345 million; exports in the same period were £A198,000 and £A372,000. Imports of drugs, chemicals and fertilisers rose by approximately £A400,000 to £A1.551 million and exports also increased by £A230,000 to £A690,000.

Rubber Shipments from Malaya.—Shipments of sheet and crepe rubber from the Malayan Union in November totalled 96,994 tons, of which the U.K. received 14,106 tons, U.S.A. 49,046, the European Continent 20,858 tons, and British Possessions 9669 tons. November shipments of latex, concentrated latex, and revertex amounted to 2969 tons, the principal recipients being U.K. 546 tons, U.S.A. 1821 tons, European Continent 356 tons, and British Possessions 125 tons.

Hungary/U.S.S.R. Reparations Agreement.—Hungary has agreed to pay a lump sum of \$45 millions to the Soviet Union as reparations of war. Of this total, \$30 millions is to be invested in the Hungarian silicate works—a mixed Hungarian-Soviet bauxite company—over a three-year period beginning January 1, 1948, the balance of \$15 millions to be paid in form of deliveries in kind in the four years beginning January 1, 1949. This information was given last week by the Hungarian Minister of Finance, M. Nyarady, when he was dealing with rumours that the Soviet Union was claiming \$200 millions.

U.S. Chemical Congress, 1948.—Advances in nuclear chemistry, food protection, petroleum, and plastics will be reported at the 121th national meeting of the American Chemical Society, which will be held in New York from September 15 to 19, 1948. Improved methods of purifying water supplies, new developments in fluorine chemistry, and progress in the production of synthesis gas are among the other subjects which will be discussed in several hundred technical papers at sessions sponsored by the eighteen professional divisions of the Society. The Priestley Medal, highest honour in American chemistry, will be presented to Prof. Warren K. Lewis, of Massachusetts Institute of Technology.

Iron from Bauxite.—Successful experiments in a pilot furnace in Ozd, Hungary, are progressing to produce iron from bauxite which, on account of its high iron content, is unsuitable for the production of aluminium. It is hoped to use the process soon on a large scale, particularly as up to now most of the iron needed in the country has to be imported.

World Narcotic Shortage.—Widespread deficiency of narcotic drugs is reflected in a supplement just issued by the Drug Supervisory Body of the United Nations of estimated world requirements of dangerous drugs in the current year. The 23 countries and dependencies associated with the survey show with few exceptions that substantial additions are required to bring stocks of morphine in various forms and cocaine and morphine to the level which it has been agreed to maintain.

Alberta Salt Co.'s New Plant.—The recently-formed Alberta Salt Co., Ltd., has announced that the plant now under construction at Elk Point, some 20 miles south-east of St. Paul, Alberta, is well on the way to completion. The company has been formed as a subsidiary of Anglo-Canadian Oil Co., Ltd., Home Oil Co., Ltd., and Calgary Edmonton Corp., Ltd. The rated capacity of the plant will be 125 tons per day. Production is expected to start early in the New Year.

More Oxygen for U.S. Steel.—The oxygen plants of Air Products, Inc., New York, have been enlarged to raise future production as high as 2000 tons per day in some cases. This development is said to be due to anticipated increased demands from the steel industry where an advanced technique using oxygen may raise steel production by as much as 20 per cent.

U.S. Chemical Education Committee

A committee of leading chemists and chemical engineers has been established by the American Chemical Society to study methods of improving chemical education in the schools and colleges of the U.S.A. Scholarship grants, accrediting of courses of study, and vocational guidance programmes are among the fields to be explored by the committee, which will act as an advisory agency to the Society's National Council. Prof. William G. Young, dean of the Division of Physical Sciences and chairman of the Department of Chemistry in the University of California at Los Angeles, is chairman.

Feeding an Army : Chemistry's Big Contribution

CHEMICAL problems connected with feeding the Army extended beyond the confines of the biochemistry of nutrition.

Mr. J. G. King addressing a Royal Institute of Chemistry meeting stated that the basis of all the ration scales was a ratio 1:1:4 in fat, protein, carbohydrate. In the tropics more salt was incorporated, and was also taken "neat" as tablets.

A large number of storage experiments were carried out on canned foods to determine the decrease in vitamin content and the extent of metal contamination over long periods in hot climates. Only with tinned carcass was trouble encountered due to tin content. Other foods were satisfactory in both respects.

Refrigeration, dehydration and canning were all used as preservative measures, dependant on the special conditions to be met. Hermetically sealed tins had the defect of yielding at extreme pressures. For instance, biscuit tins distended in planes and collapsed in submarines, in both cases upsetting the trim of the craft. When several foods were packed together, their relative humidities had to be fairly equal, otherwise transfer of moisture occurred. Thus dehydration was effected to varying extents with different foods intended for these packs, in order to produce equilibrium of vapour pressure.

In order to utilise shipping space most effectively, tables were drawn up of the number of calories per shipping ton represented by various foods. Thus (in millions) bacon

had the value of 3.39, margarine 3.96, canned turnips 0.07.

Attempts were made to utilise negative heats of solution for keeping foods warm in jacketed containers between cookhouse and field post in the following way: a hot saturated solution was made up of a solid with a big temperature coefficient of solubility and negative heat of solution. As the solid crystallised out—the theory went—the heat evolved would delay the fall in temperature. Sodium acetate and ammonium dichromate were tried but neither was successful.

Dehydration processes sterilised food but permitted deterioration by autoxidation. Hence nitrogen atmospheres had to be used, particularly for milk and vegetables.

"Non-staleing" bread was actually "delayed staling," keeping for about two weeks. Developing a suggestion made by some Portuguese refugees, the composition eventually used was flour with paraffin wax and ester gum. Despite the grim sound of this mixture, its flavour was good.

For the self-heating can the water and quicklime process was abandoned as the can sometimes had to be used below freezing point. A modified thermite mixture was found satisfactory. The fuel used in emergency stoves was initially an oil-methylated spirits emulsion, using sodium carbonate as emulsifier. With the shortage of methylated spirits hexamethylene tetramine (reject material unsuitable for explosives) was used.

"THIS CHEMICAL AGE"

IN a recent address to the Quebec City Rotary Club, Mr. J. D. Converse, of Canadian Industries, Ltd., Montreal, said that chemistry had proved itself a wreckler of industrial tradition. The industry, he said, was difficult if not impossible to classify; many enterprises found themselves as much concerned with chemical processes as with the original commodity. This was especially true in metallurgy, in the textile field and in paper manufacture.

Yet chemistry and the part it plays in business and industry was not generally recognised. "In 1945, output value of Canadian chemicals and allied products was \$472 millions greater than the output value of fisheries, trapping and electric power generated," he recalled. This huge turnover was achieved by almost 1000 plants employing more than 60,000 persons.

Emphasising that the Canadian chemical industry had only just started to grow, Mr. Converse said that from 1939 to the peak war year, 1944, the value of production from

the industry had increased more than 4½ times while the output value from all manufacturing industries had increased but only 2½.

"Less than 100 years ago," he continued, "research in chemistry was undertaken in only a few universities, principally in Britain and Europe." Aims of research were purely to advance the science. To-day industry was spending enormous sums of money in research to develop new or cheaper chemical products.

In "this chemical age," Mr. Converse said, an industrial empire founded on a basic raw material may be destroyed by an alternative process within a short time. He cited the relative merits of coal versus natural gas and petroleum as raw materials for the synthetic organic chemical industry. "These things are changing the world," concluded Mr. Converse. "Benefits of research are being made increasingly available everywhere as the industry continues serving Canadians through chemistry."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

LAUTARO NITRATE CO., LTD., London, E.C. (M., 20/12/47.) November 7, deed supplemental to trust deed dated October 22, 1925, etc.; charged on certain lands in Chile. *£3,652,970. January 10, 1947.

L. SLACK & SON, LTD., Pontypridd, chemical manufacturers. (M., 20/12/47.) November 17, by order on terms, charge, to H. Breach, Enfield, and another, securing £3000 and certain other moneys thereby reserved; charged on Glenview Brewery, Courthouse Street, Pontypridd. *Nil. May 31, 1945.

Company News

Lactagol, Ltd., reports a profit for the year ended September 30 of £12,601 as against £8567 in 1946. A final dividend of 8 per cent is recommended on the ordinary shares, together with a bonus of 2 per cent.

Glaxo Laboratories, Ltd., has declared a profit of £1,146,000 for the year ended September 30, 1947. A final dividend of 80 per cent has been recommended on the ordinary shares, making a total of 120 per cent for the year.

The name of **James B. Fleming & Co. (Liverpool), Ltd.**, manufacturing chemists, etc., 21 Hanover Street, Liverpool, has been changed to **Jas. B. Fleming & Company (Liverpool), Ltd.**, as from November 12, 1947.

The nominal capital of **Camden Chemical Co., Ltd.**, 61 Grays Inn Road, London, W.C.1, has been increased beyond the registered capital of £5000 by £20,000 in £1 ordinary shares.

The nominal capital of **Beecham Group, Ltd.** (formerly Beecham Pills, Ltd.), 55/6 Pall Mall, London, S.W.1, has been increased beyond the registered capital of £4,000,000 by £1,500,000 in £1 4½ per cent red. cum. pref. shares.

The nominal capital of **Leopold Laserson, Ltd.**, manufacturers of synthetic, aromatic and other chemical products, etc., "Laroma

House," 5 Glasshouse Walk, Albert Embankment, London, S.E.11, has been increased beyond the registered capital of £1000 by £2000 in £1 ordinary shares.

The nominal capital of **British Chemicals & Biologicals, Ltd.** (formerly Genatosan Trust, Ltd.), Harvest House, Ipswich, has been increased beyond the registered capital of £2,297,150 by £1,452,850 in 2,905,700 ordinary shares of 10s. each; 2,187,200 of the new shares are created to enable the company to acquire all or any of the issued share capital of Benger's, Ltd.

The nominal capital of **Anglo-Saxon Petroleum Co., Ltd.**, St. Helen's Court, London, E.C.3, has been increased beyond the registered capital of £71,000,000 by £70,000,000 in 7,000,000 shares of £10 each. The shares are to be issued *pari passu* to the parent companies, as required to finance the programme of expenditure, in the proportion of 60 per cent to the Royal Dutch Co. and 40 per cent to the Shell Transport & Trading Co., Ltd.

The nominal capital of **Shell Petroleum Co., Ltd.** (formerly Asiatic Petroleum Company, Ltd.), St. Helen's Court, London, E.C.3, has been increased beyond the registered capital of £31,340,000 by £10,000,000 in 1,000,000 shares of £10 each. The shares are to be issued *pari passu* to the parent companies, as required to finance the programme of expenditure, in the proportion of 60 per cent to the Royal Dutch Co. and 40 per cent to the Shell Transport & Trading Co., Ltd.

New Companies Registered

Jay-Dee Laboratories, Ltd. (12,174).—Private company. Capital £5000. Chemists, druggists and analytical and research chemists. Directors: C. E. R. Brownlow and J. Dyer, 68 Ailesbury Road, Ballsbridge, Dublin.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets has remained on a large scale, but after earlier gains, prices in most sections were moderately reactionary following the breakdown of the Foreign Ministers' Conference. There was again exceptional activity in home rails which, however, reflected the general trend and failed to hold earlier gains, after at one time being within three points of their take-over levels. British Funds also receded, and although higher on balance, leading industrial shares were below best levels. Although home rails were bought by institutional investors as an

attractive means of acquiring gilt-edged, they were again sold on a large scale by investors who realise that the nationalisation "compensation" terms will mean a heavy loss of income. Consequently, there has been big reinvestment demand for industrial shares, much of which was indiscriminate. Later, however, buying centred mainly on shares of companies which can be expected to play an important part in the export drive. Sir Stafford Cripps' latest reference to capital "cuts" and the abandoning of new plant and development plans which are not absolutely essential came as a reminder that many companies whose activities are confined to the home market will experience a difficult period in 1948.

Shares of chemical and kindred companies have not held best levels, but were mostly higher on balance for the week, Imperial Chemical being 51s. 3d., while Monsanto Chemicals were active up to 65s. 6d. before going back to 63s. 9d. United Molasses at 55s. 6d. held most of an earlier rise, while the 4s. units of the Distillers Co. strengthened to 30s. 9d. B. Laporte were 86s. 3d., W. J. Bush 87s. 6d., and Fisons transferred actively up to 71s., the latter being in demand following the information given in the prospectus in connection with the issue of 1,000,000 4 per cent cumulative redeemable preference £1 shares at 22s. each in British Chemicals & Biologicals. The latter company controls Genatosan, Ltd., Whiffen & Sons, and Benger's, Ltd., and is itself controlled by Fisons.

British Glues & Chemicals 4s. shares changed hands around 21s. British Aluminium have further strengthened to 52s., Borax Consolidated deferred were 54s. 4½d., and Turner & Newall at 84s. 9d. held most of the rise which followed the dividend increase. Moreover, British Oxygen at 102s. 6d. rallied after an earlier decline, and British Plaster Board transferred around 24s. 6d. At 77s. 3d. Dunlop Rubber lost part of an earlier advance. There was buying of paint shares, partly on higher dividend hopes, and partly on the view that in most cases consolidated accounts will show that group assets are well in excess of those of the parent company. Goodlass Wall were good, touching 42s. 3d., Pinchin Johnson further strengthened to 63s. International Paint were £7, and Lewis Berger (£9½) reflected continued satisfaction with the recent dividend announcement.

Iron and steel shares again attracted attention in view of the good yields, United Steel being 27s. 10½d., Dorman Long 29s., Colvilles 29s. 9d., and Guest Keen 48s. 6d. Stewarts & Lloyds were 58s., and Tube Investments changed hands up to £7½, having remained under the influence of the statements at the annual meeting.

In other directions, Boots Drug eased to 61s. 9d., but Beechams deferred at 23s. 6d. moved better on balance. Triplex Glass firmed up to 21s. 3d. Oil shares were again active, although Shell eased to 73s. 9d. with the new shares only 14s. 4½d. premium. Anglo-Iranian, however, were better at £8 5/16 following news of the company's big new storage and refinery developments, which are scheduled to coincide with the completion of the new Middle East pipe line in 1951.

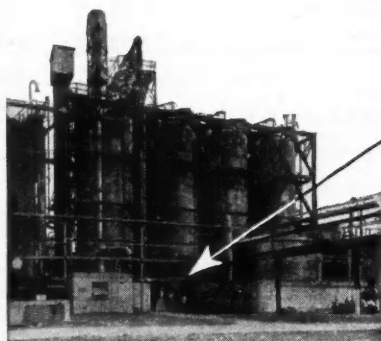
British Chemical Prices

Market Reports

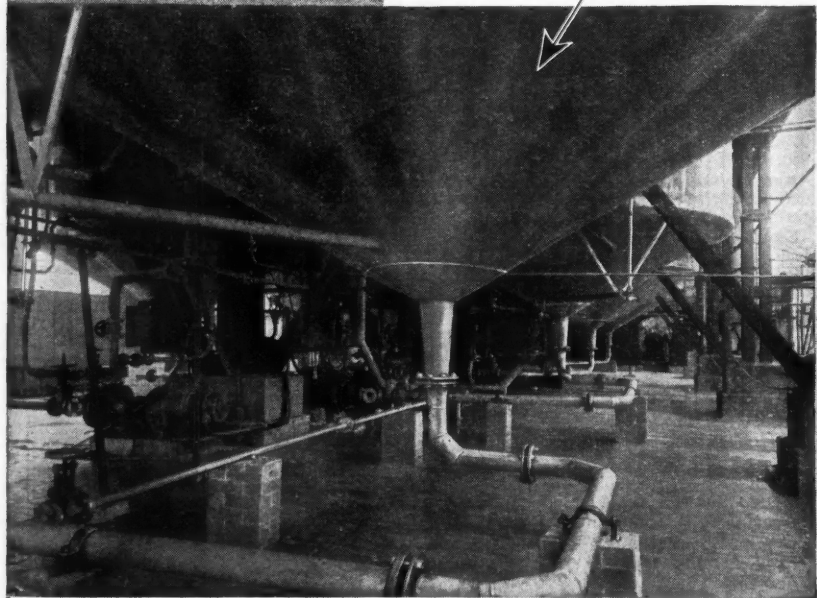
A FIRM undertone characterises nearly all sections of the industrial chemicals market and the active conditions reported last week have been continued. Buying on home account has been steady, covering new bookings as well as replacement contracts. The volume of overseas inquiry has been fairly substantial. The market is without any special feature and no items have shown noteworthy changes. The chief interest in the coal-tar products market is the awaited announcement of controlled rates for the New Year.

MANCHESTER.—A fair degree of activity has been reported on the Manchester chemical market during the past week and fresh inquiries have related to both light and heavy descriptions, all of which continue on a very firm price basis. Shippers have again been in the market for parcels for export, but in many instances they are experiencing difficulty in arranging for early shipment. On the home side, there is steady pressure for deliveries from the cotton and woollen textile trades and from other leading industrial users. Except in one or two sections, new business in fertilisers has been only moderate during the past few days. A steady demand for most of the tar products, both light and heavy, has again been reported.

GLASGOW.—Demand has been fairly well maintained over the whole range of chemicals in the Scottish chemical market during the past week. There has been an increased demand for antimony salts and magnesium chloride. In the export market, there has also been some increased demand for antimony salts. Information has been received which shows that the prices for waxes and many chemicals of U.S. origin are very considerably lower than the price at which the materials can be offered from this country. It may be possible to increase exports to Canada in view of the dollar shortage, but it is unlikely that the materials which they buy from the sterling area and which they previously bought from the dollar area will be as cheap.



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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Production of coatings on aluminium and its alloys.—American Chemical Paint Co. June 30, 1945. 24766-67/1947.

Catalyser to hydrogenise mineral oils in vapour phase and in liquid phase.—Azienda Nazionale Idrogenazione Comlustilili A.N.I.C. May 7, 1945. 24886/1947.

Vinyl chloride copolymer and process for making it.—Carbide & Carbon Chemicals Corporation. May 26, 1943. 10319/1947.

Manufacture of phenyl alkyl siloxanes.—Corning Glass Works. Dec. 5, 1945. 24255/1947.

Preparation of catalysts and use in the manufacture of gasoline.—Davison Chemical Corporation. April 5, 1946. 37788-89/1946.

Preparation of catalysts and use in the manufacture of gasoline.—Davison Chemical Corporation. April 5, 1946. 37790-91/1946.

Manufacture of new organo-silicon oxide condensation products.—Dow Chemical Co. March 30, 1946. 8011/1947.

Esterification process.—E.I. Du Pont de Nemours & Co. Jan. 25, 1946. 2260/1947.

Production of vinyl cyanide.—E.I. Du Pont de Nemours & Co. March 30, 1946. 8449/1947.

Azo dyes.—General Aniline & Film Corporation. March 27, 1946. 24223-24/1947.

Method of and apparatus for the separation of acidic gases from gaseous mixtures.—Girdler Corporation. March 26, 1946. 25178/1947.

Process for the manufacture of isooalloxazines.—F. Hoffmann-La Roche & Co., A.G. April 4, 1946. 7597/1947.

Process for the manufacture of ribonic acid lactone.—F. Hoffmann-La Roche & Co., A.G. April 2, 1946. 7599/1947.

Hydrogen-cyanide recovery.—Koppers Co., Inc. Oct. 14, 1942. 3671/1946.

Processes for the production of vinylic ethers.—Montecatini Soc. Generale per l'Industria Mineraria e Chimica. July 4, 1944. 24876/1947.

Condensing zinc vapour.—New Jersey Zinc Co. Nov. 3, 1945. 13404/1946.

Manufacture and utilisation of cold setting polyhydric phenolic aldehyde adhesives.—P. H. Rhodes. Oct. 6, 1942. 12761/1944.

Method of producing copolymer resins and products derived therefrom.—Aug. 12, 1942. 12904/1945.

Production of alkyl silicones.—Soc. des Usines Chimiques Rhone-Poulenc. March 26, 1946. 27598/1946.

Preparation of benzene hexachloride.—Solvay & Cie. March 28, 1946. 18016/1946.

Process and apparatus for the manufacture of zinc oxide.—Union Oxides (Proprietary), Ltd., and G. Banasz. April 5, 1946. 7354/1947.

Alloy steel and articles made therefrom.—Universal Cyclops Steel Co. Nov. 8, 1943. 1065/1945.

Preparation of antispasmodic agents.—Wintrop Chemical Co., Inc. Feb. 28, 1946. 2255/1947.

KEEBUSH

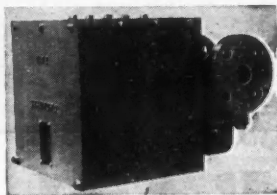
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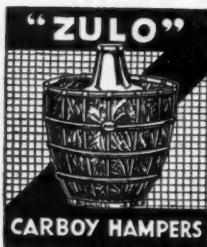
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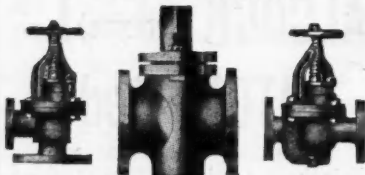


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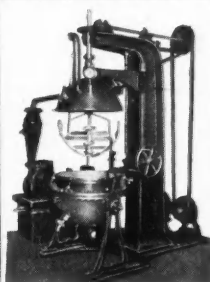
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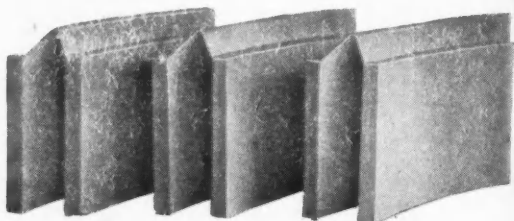
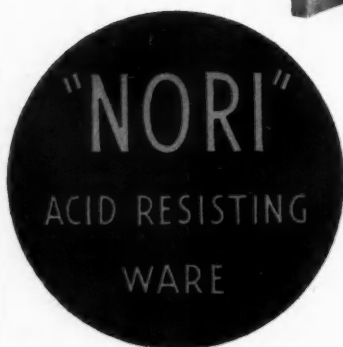
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